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National Water Quality Inventory 1977
Report to Congress

(U.S.) Environmental Protection Agency
Washington, DC

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EPA

National Water Quality Inventory

1977 Report to Congress

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This report was prepared pursuant to Section 305(b) of PL 92-500, which states:

"(b) (1) Each State shall prepare and submit to the Administrator by January 1, 1975, and shall bring up to date each year thereafter, a report which shall include—

"(A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this Act (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act) and the water quality described in subparagraph (B) of this paragraph;

"(B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;

"(C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what waters such additional action is necessary;

"(D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and

"(E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the cost of implementing such programs.

"(2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and annually thereafter.

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This report is based on State water quality reports to EPA mandated under Section 305(b) of the Clean Water Act. It includes information on the following topics: water pollution problems from point and nonpoint sources; causes and effects of pollution problems; and water pollution control programs. Appendix A consists of a chart of pollution problems and sources by hydrologic basin; Appendix B consists of summary excerpts of the State Section 305(b) reports.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

October 31, 1978

THE ADMINISTRATOR

Dear Mr. President
Dear Mr. Speaker

I am transmitting to the Congress the National Water Quality Inventory Report for 1977, as required by Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). The Clean Water Act of 1977 (Public Law 95-217) amended Section 305(b) so that these reports are now required only every other year, beginning with the 1976 report. However, by the time PL 95-217 was passed, the States had completed their 1977 reports. I am therefore transmitting those reports along with our summary and analysis of them.

The State reports are continuing to improve with respect to the amount of water quality information provided, in terms of both geographic coverage and problem definition. This year we have been able to use the information in those reports to provide a summary of pollution problems and the sources of those problems for approximately 250 hydrological basins covering almost the entire United States. Problems with bacteriological contamination, oxygen depletion, and excess nutrient levels continue to be widely reported, with both point sources and nonpoint sources of these types of pollution affecting portions of well over half of the basins across the country. In addition, as more information on toxic pollutants becomes available, the States are reporting problems related to them in more and more areas. Portions of 44 percent of the basins across the country had some type of problem with toxic pollutants from point sources, principally from industrial discharges. In the Northeast and the Great Lakes regions, 63 percent of the basins were affected. Nonpoint sources including urban runoff, mining, and agricultural activities also contribute toxic pollutants such as heavy metals and pesticides in many areas.

While the State reports focused on identifying water quality problem areas, they also continued to provide examples of situations where pollution abatement programs have produced significant improvements in water quality. The National Water Quality Inventory Report for 1976 described 17 such cases.

Finally, the report briefly describes the major provisions of the 1977 Clean Water Act. This Act has increased the emphasis on controlling toxic pollutants and provided some useful procedural changes, while maintaining the basic structure and goals of PL 92-500.

Sincerely yours,

Douglas M. Costle

Honorable Walter F. Mondale
President of the Senate
Washington, D.C. 20510

Honorable Thomas P. O'Neill, Jr.
Speaker of the House of Representatives
Washington, D.C. 20515

Acknowledgement

This report is based primarily on submissions from the individual States and other jurisdictions of the United States. The Environmental Protection Agency greatly appreciates the time and effort expended by State and local agencies and by regional commissions in preparing these reports.

The following individuals from EPA also made significant contributions during the preparation of this report: William Nuzzo (Region I); Harry Allen (Region II); Gerald Pollis (Region III); David Hill (Region IV); Michael MacMullen (Region V); Tom Reich (Region VI); Dale Parke (Region VII); Patrick Godsil (Region VIII); Daniel Collier (Region IX); William Schmidt (Region X); Robert Arvin, Adelaide Lightner, Alec McBride and Jonathan Pawlow, Monitoring and Data Support Division; and others too numerous to mention who were, nevertheless, instrumental in contributing to the final product.

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Executive Summary

Scope

This report, the fourth in a series of *National Water Quality Inventory* reports, was prepared by the U.S. Environmental Protection Agency and is based on water quality reports to Congress submitted by the States and other jurisdictions of the United States. The 1977 submissions from 38 States and five other jurisdictions are being transmitted to Congress in their entirety under separate cover. These reports have been prepared annually pursuant to Section 305(b) of PL 92-500.

The major focus of this year's national overview of water quality is to identify, based on information provided by the States, water pollution problems and the sources of those problems in 246 hydrological drainage basins covering almost the entire country. It should be noted that in some cases, particularly with regard to toxic pollutants, the fact that a problem is not identified may be due to a lack of monitoring data and not because the problem does not exist. Also, the identification of a problem does not necessarily mean that the entire basin is affected; in many cases only a small percentage of the stream miles are impacted.

The report also describes the major provisions of national water pollution control programs and discusses the implementation of those programs. In addition, Appendix B provides summary material excerpted from each of the State reports.

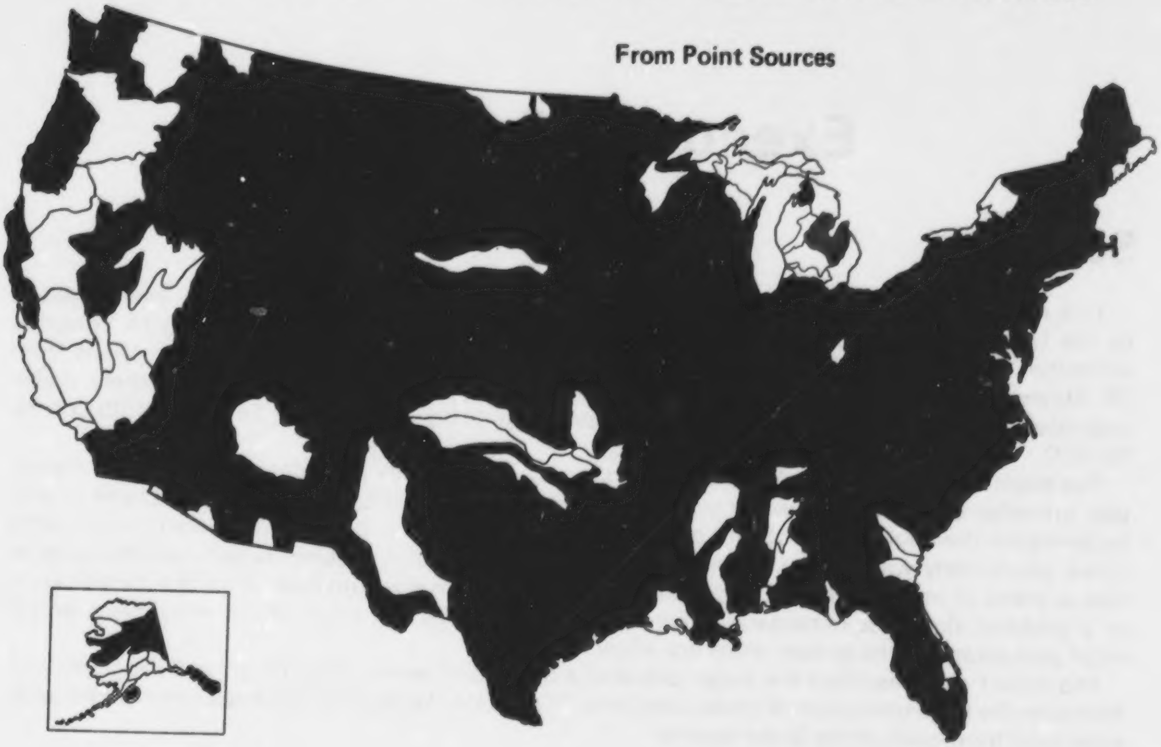
Causes and Effects of Traditional Pollution Problems

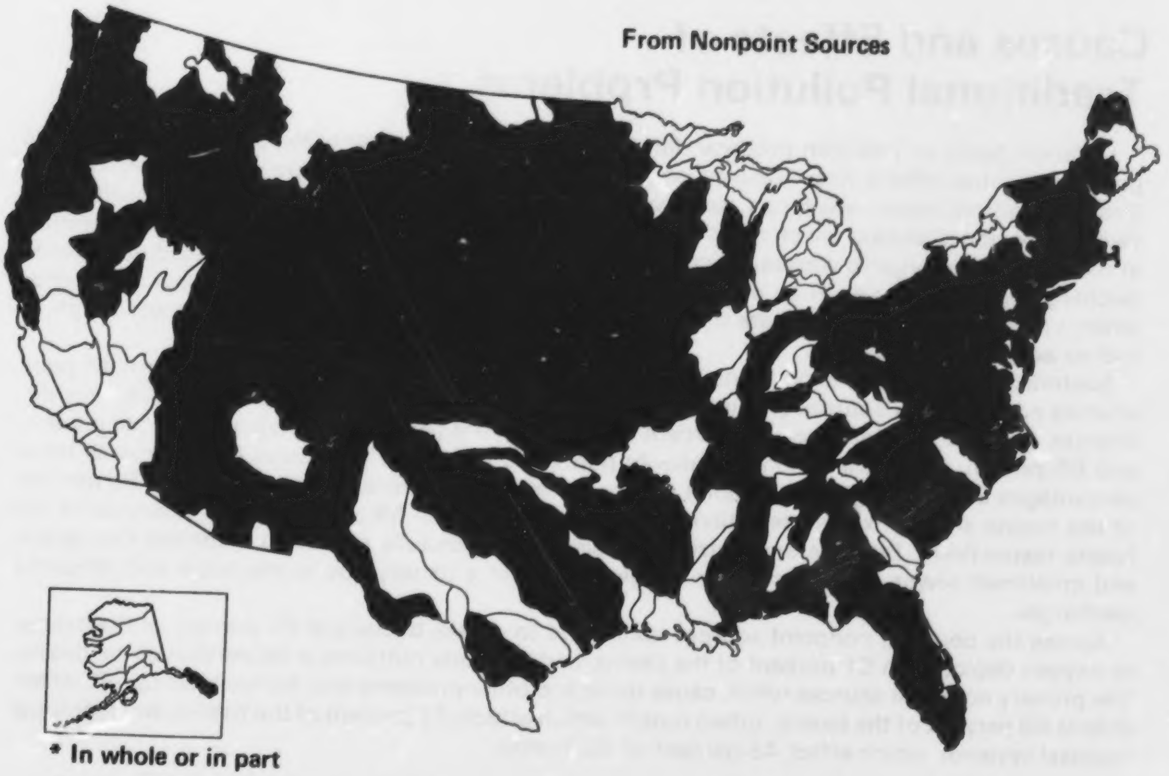
Different types of pollution produce different forms of water quality degradation. Traditionally, pollution control efforts have focused on the most noticeable forms of pollution. These include: Bacterial contamination which can make waters unsafe for contact recreation and for shellfish harvesting; oxygen depletion which can cause fish mortality if too much dissolved oxygen is consumed in the oxidation of organic wastes; nuisance growths of algae and other aquatic plants due to excess discharges of nutrients such as nitrogen and phosphorus; and excess levels of suspended solids which can destroy aquatic habitats through sedimentation and can cause direct damage to fish as well as aesthetic degradation.

Bacteria, oxygen-demanding loads, and nutrients are widespread problems due to both point sources and nonpoint sources (Figure E-1). The percentages of basins affected by point source discharges of these pollutants are 78 percent for bacteria, 79 percent for oxygen-demanding loads, and 69 percent for nutrients. In the heavily populated Northeast and Great Lakes regions these percentages are even higher, with point source contributing to excess bacteria levels in 86 percent of the basins and to oxygen depletion and excess nutrients in 89 percent and 74 percent of the basins respectively. Bacteria and nutrient problems are generally related to municipal discharges and combined sewer overflows, while oxygen depletion is usually due to municipal and industrial discharges.

Across the country, nonpoint sources contribute to excess bacteria in 61 percent of the basins, to oxygen depletion in 51 percent of the basins, and to excess nutrients in 56 percent of the basins. The primary nonpoint sources which cause these and other problems are: Agricultural runoff, which affects 68 percent of the basins; urban runoff, which affects 52 percent of the basins; and individual disposal systems, which affect 43 percent of the basins.

FIGURE E-1
BASINS AFFECTED* BY BACTERIOLOGICAL CONTAMINATION


From Point Sources


From Nonpoint Sources

* In whole or in part

Note: Affected basins are shaded

Problems from suspended solids are more often due to nonpoint sources, although in the Northeast point sources are a major contributor of suspended solids (Figure E-2). For the country as a whole, nonpoint sources contribute to excess suspended solids in 54 percent of the basins, while point sources are a significant contributor in only 35 percent of the basins. Runoff from urban, agricultural, and mining areas are the major nonpoint source contributors of suspended solids.

Causes and Effects of Toxic Pollution Problems

Increasing concern has developed over the last few years regarding the effects of toxic pollutants such as heavy metals, pesticides, and other chemical compounds including phenols, cyanides and polychlorinated biphenyls (PCBs). There are several reasons why these substances cause particular problems in their detection and control. First, the number of chemical compounds in common use today is enormous, approximately 60,000 with 1,000 more being developed each year. Second, many of these substances can have toxic effects on humans or aquatic life in concentrations which are below levels which can be detected using readily available measurement techniques. Third, many of these substances are highly persistent in the environment. They tend to concentrate in bottom sediments from which they enter the aquatic food chain and eventually bioaccumulate in fish and other higher forms of aquatic life. They also can contaminate groundwaters through deep well injection of industrial wastes or leachates from landfills, landspreading, and impoundments. Fourth, many of these substances are generally not removed by conventional municipal treatment technology, so that some industries discharging to municipal facilities must pretreat certain toxic wastes. Other potential problems, such as possible synergistic effects, canot yet be fully evaluated due to lack of information.

Heavy metals such as cadmium, chromium, copper, lead, nickel, mercury, and zinc can be toxic to various fish populations at very low concentrations. In addition, cadmium has been known to cause lethal kidney and bone diseases in humans, and instances of severe brain damage from lead and mercury have been observed. Organic toxics including many pesticides can also be lethal to aquatic life or can cause long-term effects by imparing growth or reproduction. Many of these substances are also suspected to be carcinogenic or otherwise harmful to humans.

Problems with toxic pollutants from point sources are generally due to industrial discharges, either directly to the receiving waters or to a municipal sewer system. Across the country, 44 percent of the basins were affected by toxics from point sources, with the most widespread impacts being in the Northeast, North Central and Great Lakes regions where 62 percent of the basins were affected (Figure E-3).

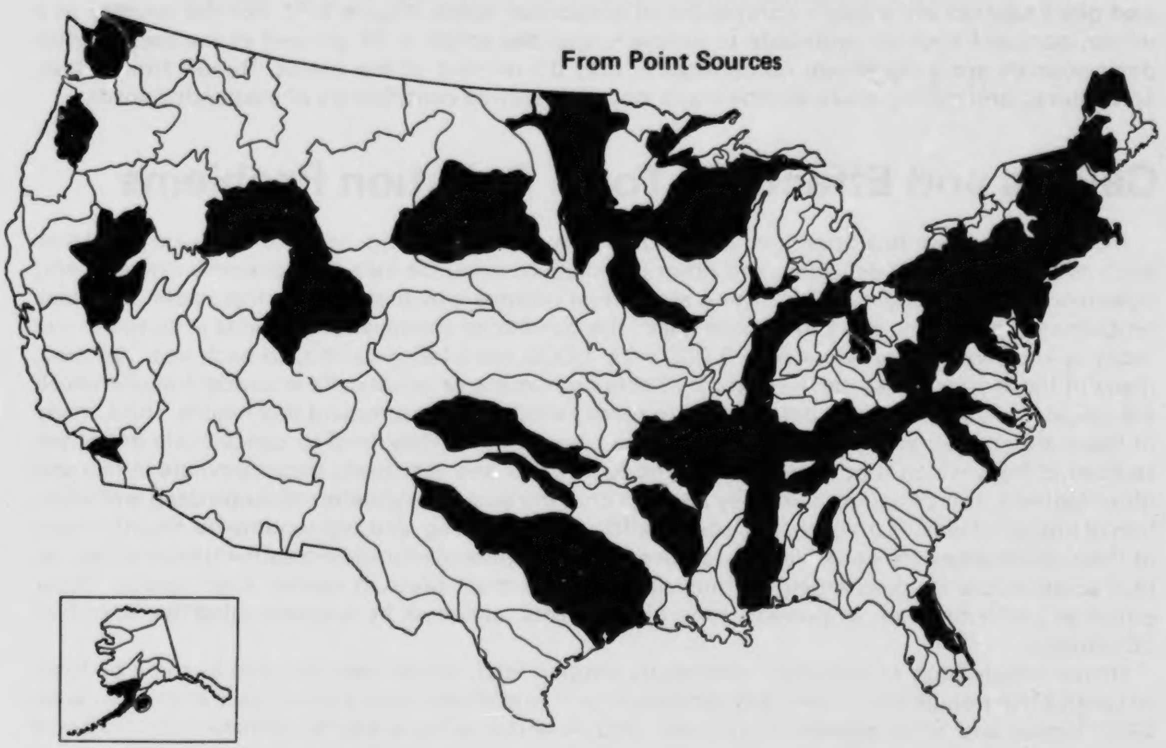
The most widely reported problems with toxic pollutants from nonpoint sources were pesticides in runoff from agricultural areas and heavy metals in runoff from urban areas and in runoff or leachates from mining areas. Across the country, 22 percent of the basins were affected by pesticides, with most of them being located in the North Central, South Central, and Southeast regions (Figure E-3). Other toxics, principally metals, from nonpoint sources affected 32 percent of the basins across the country, with most of the impacts being in urban and mining areas (Figure E-3).

These discussions of toxic pollutants generally do not describe potential problems from harmful organic contaminants, since significant monitoring for these pollutants has begun only recently. The 1978 report will have more information on the nature and extent of pollution due to organic toxics.

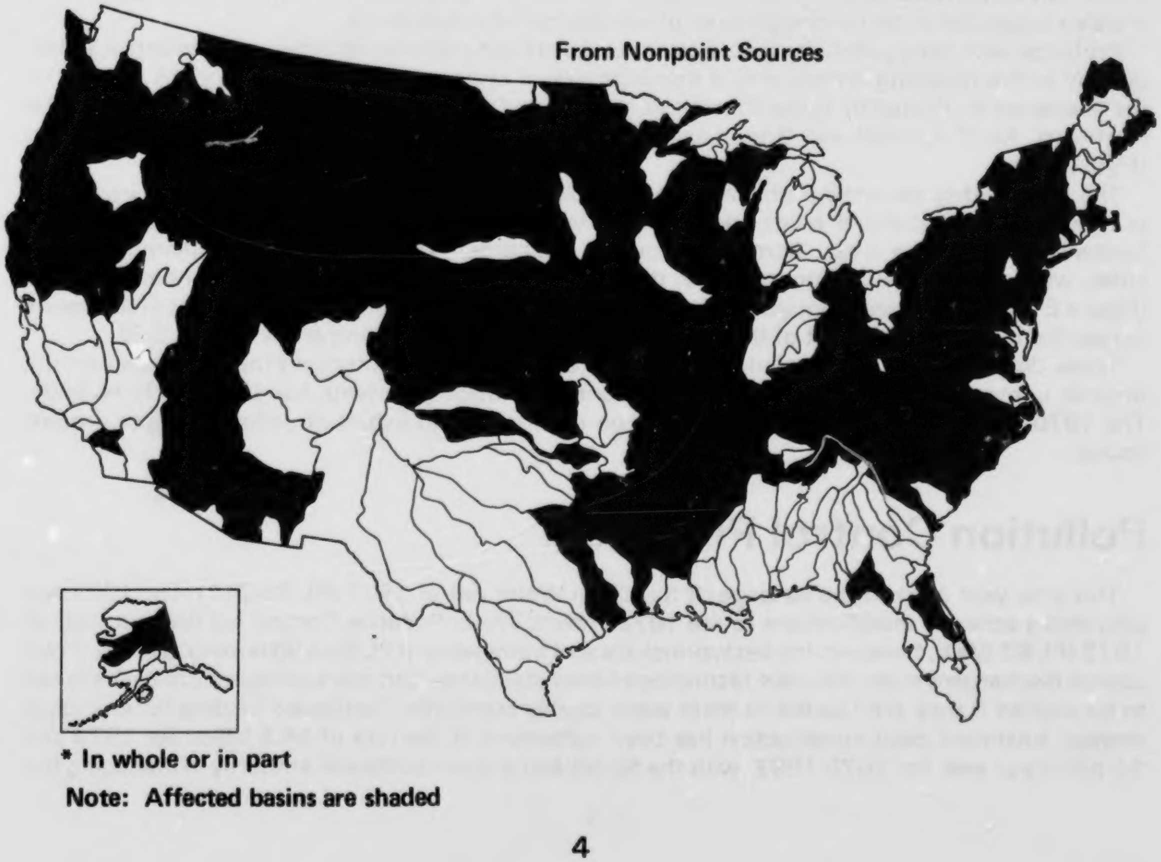
Pollution Control Programs

This past year marked the passage of the Clean Water Act of 1977 (PL 95-217). The 1977 Act provided a series of modifications to the 1972 Federal Water Pollution Control Act Amendments of 1972 (PL 92-500); however, the basic principles and framework of PL 92-500 remained intact. Point source dischargers must still meet technology-based standards, and more stringent controls are still to be applied if they are needed to meet water quality standards. Continued funding for municipal sewage treatment plant construction has been authorized at the rate of $4.5 billion for 1978 and $5 billion per year for 1979-1982, with the States being given additional authority in managing the

FIGURE E-2
BASINS AFFECTED* BY EXCESS SUSPENDED SOLIDS



From Point Sources



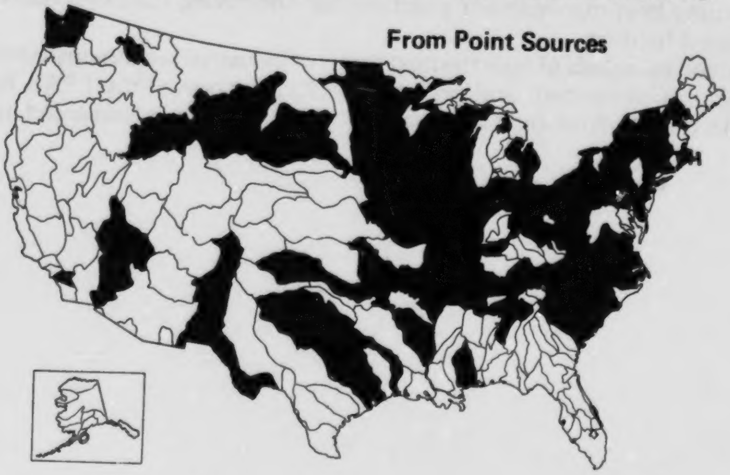
From Nonpoint Sources

* In whole or in part

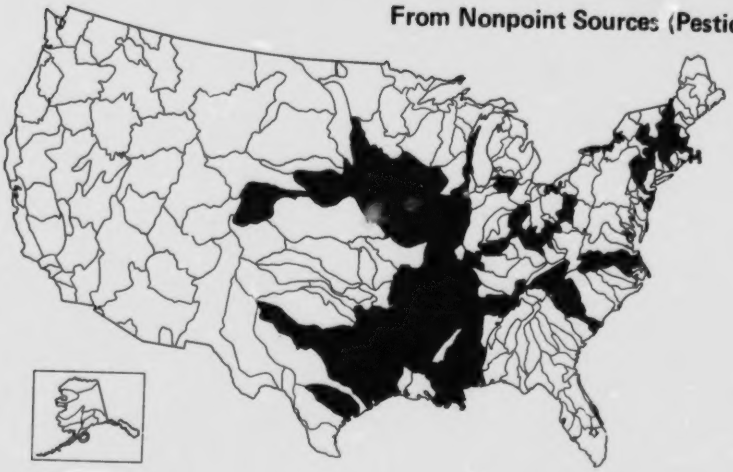
Note: Affected basins are shaded

FIGURE E-3
BASINS AFFECTED* BY TOXIC POLLUTANTS

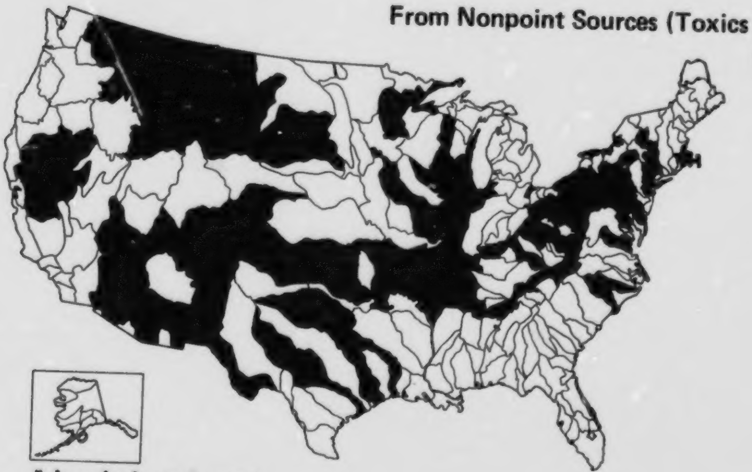
From Point Sources



From Nonpoint Sources (Pesticides only)



From Nonpoint Sources (Toxics other than pesticides)



* In whole or in part

Note: Affected basins are shaded

program. The Section 208 Water Quality Management Planning program, which is the primary merchanism for developing best management practices for controlling nonpoint sources, has also been authorized continued funding.

The major changes involved details of how the next series of industrial technology-based standards would be developed and implemented, and provisions which increased the EPA's flexibility and authority in dealing with toxic pollutants. A discussion of these changes is presented in Chapter III.

Introduction

This report is the fourth in a series of *National Water Quality Inventory* reports prepared by the U.S. Environmental Protection Agency for submittal to Congress. The 1977 report is based on water quality reports to Congress which have been prepared for the last three years by the States under Section 305(b) of PL 92-500. Table 1 lists all of the State reports which have been submitted to date. The Clean Water Act of 1977 (PL 95-217) amends Section 305(b) such that after 1978 these reports will be prepared on a biennial rather than an annual schedule.

This year's national overview of water quality focuses on identifying, based on information provided by the States, water pollution problems and the sources of those problems in 246 hydrological drainage basins covering almost all of the country. A listing and a map of those basins is provided in Appendix A, as is a detailed description of the methodology used in developing the summary information. The report also describes the major provisions of national water pollution control programs and discusses the implementation of those programs.

The report does not cover topics which were discussed in earlier reports in the series and for which no new significant national information was provided in the 1977 State reports. These topics include projections of water quality relative to the goals of the Act, water quality trends, and the economic and social costs and benefits of achieving the goals of the Act.

The 1976 report summarized the comparisons provided by 14 States of current water quality conditions with projected water quality conditions after implementation of the point source control requirements specified in the Act. The comparisons indicate that most of these 14 States expect significant additional improvements from further point source controls.

National trend evaluations were done by the EPA for 22 major rivers in the 1974 report and were summarized from the State submittals in the 1975 report. These two reports concluded that, in general, water quality was improving across the country. In addition, the 1976 report provided brief descriptions of 17 areas which had experienced significant improvements in water quality.

Both the 1975 and 1976 reports provided summaries and analyses of the States' discussions on the costs and benefits of water pollution control programs. The major conclusions from these reports were that the State estimates for control of industrial discharges were generally less than the estimates provided by national economic models, and that the costs of controlling nonpoint sources were generally not known but were expected to be considerable.

In addition to summarizing the State reports, the 1975 and 1976 national overviews also presented the results of some special studies. The 1975 report included a summary of the results from the EPA's National Eutrophication Survey of lakes and a discussion of water quality variations with land use patterns, utilizing results from the EPA's National Water Quality Surveillance System. The 1976 report included a summary of water quality conditions in the Great Lakes and a discussion of oil spills.

TABLE I

WATER QUALITY REPORTS SUBMITTED UNDER SECTION 305(b) OF PL 92-500

	1975	1976	1977
Alabama	x	x	x
Alaska		x	
American Samoa	x		
Arizona	x	x	x
Arkansas	x	x	x
California	x	x	
Colorado	x		
Connecticut	x	x	x
Delaware	x	x	x
District of Columbia	x	x	x
Florida	x	x	x
Georgia	x	x	x
Guam	x	x	x
Hawaii	x	x	x
Idaho	x	x	x
Illinois	x	x	
Indiana	x	x	x
Iowa	x		
Kansas	x	x	x
Kentucky	x	x	x
Louisiana	x	x	x
Maine	x	x	x
Maryland	x	x	x
Massachusetts		x	x
Michigan	x	x	x
Minnesota	x	x	x
Mississippi		x	x
Missouri	x	x	x
Montana	x	x	
Nebraska	x	x	x
Nevada	x	x	
New Hampshire	x	x	x
New Jersey	x		x
New Mexico	x	x	x
New York	x	x	x
North Carolina	x	x	x
North Dakota	x	x	
Ohio	x	x	x
Oklahoma	x	x	x
Oregon	x	x	x
Pennsylvania	x	x	x
Puerto Rico	x	x	x
Rhode Island	x	x	x
South Carolina	x	x	x
South Dakota	x		
Tennessee	x	x	x
Texas	x	x	x
Trust Territories of the Pacific	x	x	x
Utah	x	x	
Vermont	x	x	x
Virginia	x	x	
Virgin Islands	x	x	x
Washington	x	x	
West Virginia	x	x	x
Wisconsin	x	x	x
Wyoming	x	x	x

Chapter I

Water Pollution Problems from Point Sources

The distinction between point sources and nonpoint sources of pollution is not always clear. Point sources are generally described as those which discharge to the receiving waterbody through a discreet pipe or ditch. However, this definition can encompass a very wide range of discharges since runoff from almost any type of area can eventually reach the receiving waterbody through some type of culvert, ditch, or gully. Therefore, in this discussion, point sources will be defined as industrial discharges (including large feedlot discharges but not including discharges from other agricultural activities or from mining and silviculture areas), municipal sewage treatment plant discharges, and combined sewer overflows.

Across the country, a total of 91 percent of the basins were affected to some degree by point source discharges (Appendix A).

Industrial Discharges

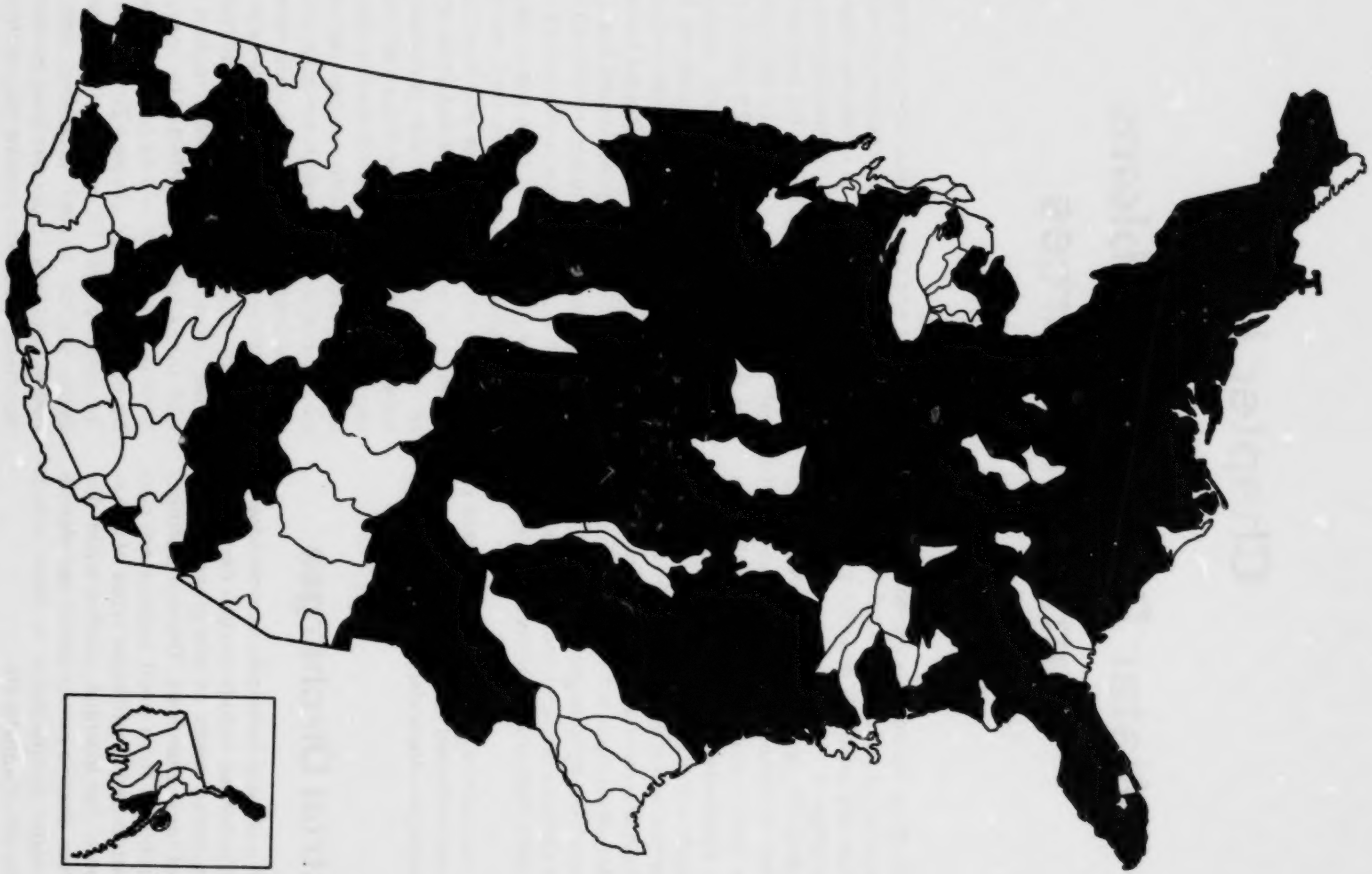
Pollution problems commonly associated with industrial discharges include oxygen depletion, excess suspended solids, oil and grease, heavy metals, and toxic chemicals. Thermal pollution and pH problems from point sources are also generally attributed to particular types of industrial effluents. For example, cooling water discharges from electric power plants can elevate receiving water temperatures to levels which significantly affect aquatic life.

The extent to which industrial discharges affect water quality varies considerably across the country, as does the type of impact. The Northeast and Great Lakes regions are the most affected by industrial discharges, as would be expected (Figure I-1). In these two regions, 88 percent of the basins were impacted by industrial discharges as compared to 65 percent for the rest of the country (Table I-1). By contrast, in the Southwest region only 23 percent of the basins were affected by industrial discharges.

The type of water pollution problem from industrial point sources also varies according to geographic region. In the Northeast, Great Lakes and North Central regions, where heavy industries such as steel manufacturing have traditionally been located, point source related problems from pollutants such as toxic heavy metals and other industrial chemicals are much more extensive than in the Southeast and Northwest regions, where much of the industrial activity is related to food and timber processing. The wastes from these latter industries are more organic in nature and are therefore more likely to cause problems with oxygen demand and excess nutrients, although the pulp and paper industry does discharge some toxic materials.

The summary of pollution problems by region strongly illustrates this point. In the Northeast, Great Lakes, and North Central regions 55 percent of the basins are affected by heavy metals from point sources, and 42 percent are affected by nonmetal toxics (Table I-2). For the rest of the country, only 23 percent of the basins have point source related problems with heavy metals, and only 15 percent have problems with nonmetal toxics. The relative magnitude of toxics problems in the "heavy industry" regions is much greater than would be expected by simply comparing the percentages of basins affected by

FIGURE I-1
BASINS AFFECTED* BY INDUSTRIAL DISCHARGES



* In whole or in part

Note: Affected basins are shaded

industrial discharges between the different regions.

Municipal Discharges

When States describe problems with municipal discharges, they are generally referring to inadequately treated sewage. In situations where a municipal plant discharge is causing a problem because an industrial discharge into that plant has not received adequate pretreatment, the States usually describe this as an industrial discharge problem. Problems from combined sewer overflows are discussed in the following section.

Municipal discharges were reported to impact water quality in 89 percent of the basins across the country (Table I-1). As would be expected, the more heavily populated regions generally had a higher percentage of basins affected, although even in the sparsely populated Southwest, 64 percent of the basins had some problems from municipal discharges. Most of these problems were due to inadequate treatment or overloaded plants, and the States expected that most of them would be resolved as construction grant funding became available (see Chapter III) and the facilities could be upgraded.

The pollutants in municipal discharges that most often cause problems are fecal coliform bacteria, oxygen-demanding loads, and nutrients such as phosphorus and nitrogen. These pollutants cause the most widely reported water quality problems from point sources (Table I-2). Bacteria and nutrient problems are generally related to municipal discharges and combined sewer overflows, while oxygen depletion is usually a problem from municipal and industrial discharges although combined sewer overflows also can contribute. For many of the basins, the State reports attributed the degraded water quality conditions from excess bacteria, nutrients, oxygen-demanding loads, and suspended solids to a combination of different types of point source discharges.

TABLE I-1

POINT SOURCES OF POLLUTION

Region (Number of basins)	Percentage of Basins Affected* by Type of Point Source: Industrial	Municipal	Combined sewer overflows
Northeast (40)	95	95	60
Southeast (47)	74	91	17
Great Lakes (41)	80	95	37
North Central (35)	74	86	6
South Central (30)	70	100	0
Southwest (22)	23	64	0
Northwest (22)	55	73	14
Island (9)	89	100	0
Total (246)	72	89	21

*In whole or part.

TABLE I-2

EFFECTS OF POINT SOURCES OF POLLUTION

	Percentage of Basins Affected* by Type of Pollution Problem from Point Sources									
Region (Number of basins)	Thermal	Bacteria	Oxygen depletion	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Nonmetal toxics
Northeast (40)	33	93	93	78	70	13	15	35	58	43
Southeast (47)	11	77	89	70	26	9	17	6	26	28
Great Lakes (41)	24	80	85	71	44	27	24	34	51	59
North Central (35)	11	89	80	74	23	20	14	0	57	23
South Central (30)	3	73	87	83	30	30	10	13	43	7
Southwest (22)	5	50	36	41	14	23	5	5	9	5
Northwest (22)	0	68	55	55	23	5	5	0	5	14
Islands (9)	33	89	78	56	33	11	0	44	22	11
Total (246)	15	78	79	69	35	17	14	16	38	28

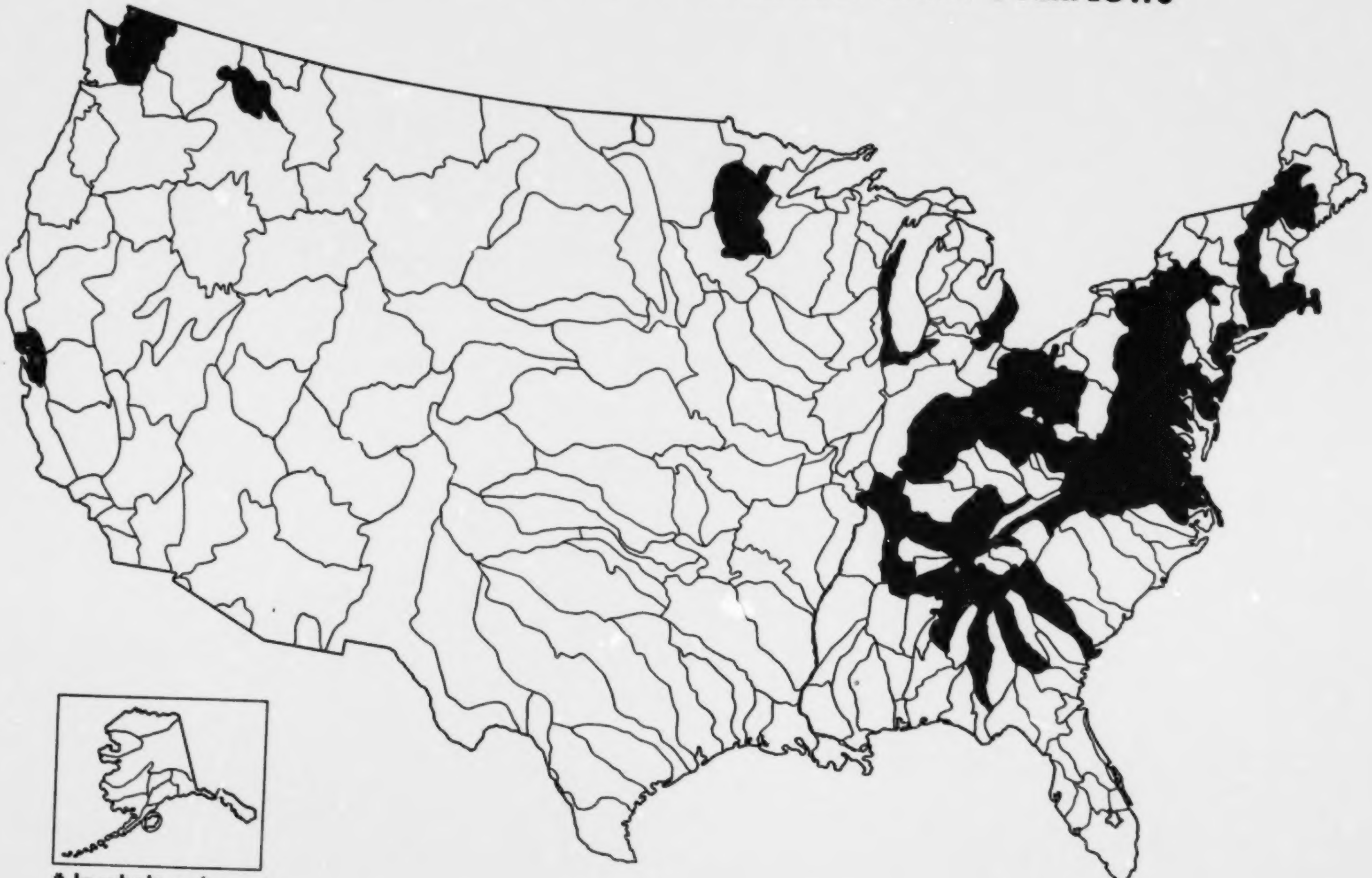
*In whole or in part.

Combined Sewer Overflows

Combined sewer overflows occur when excessive rainfall runoff is added to normal sewage flows in systems where storm and sanitary sewers are combined. The resulting overflow results in a discharge containing pollutants from both the sewage (principally bacteria, nutrients and oxygen-demanding loads), and the urban runoff (principally suspended solids, heavy metals, and oil and grease). These discharges can cause extremely severe water quality degradation.

Combined sewers are generally located in older cities, and problems from combined sewer overflows are therefore found primarily in the Northeast and Great Lakes regions (Figure I-2). Almost half the basins in those regions have problems from combined sewers, as compared to only eight percent for the rest of the country (Table I-1). Some Northeast and Great Lakes States report that combined sewer overflows cause the most serious water quality problems in certain basins.

FIGURE I-2
BASINS AFFECTED* BY COMBINED SEWER OVERFLOWS



* In whole or in part

Note: Affected basins are shaded

Chapter II

Water Pollution Problems from Nonpoint Sources

The effects of nonpoint sources of pollution on water quality conditions are not as well understood and documented as are point source effects. Even the definition of nonpoint sources is not clear, since several States refer to problems such as urban runoff, agricultural return flows, and runoff from mines as point sources for purposes of issuing discharge permits. Nevertheless, the States generally did agree that nonpoint sources were often a significant problem, affecting 87 percent of the basins across the country (Appendix A), and that greater efforts should be expended to determine the extent of nonpoint sources effects and to develop procedures by which they can be controlled.

The State discussions of nonpoint source problems fell for the most part into eight categories: Urban runoff, runoff from construction sites, hydrologic modifications, runoff (including irrigation return flows), runoff from silvicultural areas, runoff from active and abandoned mining areas, agricultural runoff, runoff and leachates from solid waste disposal sites, and runoff and leachates from individual disposal systems such as septic tanks. Other problems such as pollutant washout from the air during rainfall, transportation-related spills, and vessel wastes were

TABLE II-1

NONPOINT SOURCES OF POLLUTION

Region (Number of basins)	Percentage of Basins Affected* by Type of Nonpoint Source							
	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid Waste disposal	Individual disposal
Northeast (40)	70	15	20	10	20	55	35	63
Southeast (47)	57	2	21	30	15	62	9	40
Great Lakes (41)	54	7	2	15	41	59	15	39
North Central (35)	54	6	3	6	40	89	9	29
South Central (30)	50	0	23	13	53	87	13	40
Southwest (22)	23	0	18	5	36	73	0	35
Northwest (22)	23	23	23	27	23	55	9	32
Islands (9)	67	67	22	0	0	78	22	89
Total (246)	52	9	15	15	30	68	14	43

*In whole or part.

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described by a few States, but these were not as widely discussed as the eight categories listed above.

Agriculture

Agricultural activities are the most widespread cause of nonpoint source problems, affecting over half of the basins in each geographic region (Table II-1). The most affected regions are the North Central, South Central, Southwest, and the Islands (Figure II-1). A total of 83 percent of the basins in these regions are affected, as compared to 58 percent for the rest of the country.

Pollution due to agricultural activities can come from runoff or from irrigation return flows. Runoff will generally result in increased levels of bacteria, suspended solids, nutrients, and pesticides; while irrigation return flows will primarily increase dissolved solids, nutrients, and pesticides. Of the four regions listed above, agricultural runoff problems would be expected to provide significant impacts in the North Central region (from spring snow melting) and in the Islands (from heavy rains). In fact, these two regions do have a higher percentage of basins than the rest of the country with nonpoint source problems from bacteria (73 percent *vs* 58 percent), suspended solids (84 percent *vs* 48 percent), nutrients (59 percent *vs* 55 percent), and pesticides (39 percent *vs* 18 percent) (Table II-2).

The heavily irrigated agricultural areas are in the Southwest, South Central, and North Central regions; and these regions are considerably more affected by dissolved solids problems from nonpoint source than is the rest of the country (62 percent of the basins affected *vs* 13 percent). Pesticide and nutrient problems were widely reported in the North and South Central regions but not in the Southwest region.

Urban Runoff

Urban runoff is cited as a primary cause of water quality degradation in heavily populated areas. Almost every type of pollutant is found in urban runoff, with the most severe effects generally coming from suspended solids and toxics, particularly heavy metals. Bacteria, oxygen-demanding loads, nutrients, and oil and grease are other pollutants frequently mentioned in discussions of urban runoff.

Across the country, 52 percent of the basins were affected by urban runoff (Table II-1). As would be expected, the highest percentage of affected basins (70 percent) is in the densely populated Northeast region, while the lowest percentages were in the Southwest and Northwest regions (23 percent).

It is difficult to determine the extent to which each category of nonpoint sources contributes to a particular type of pollution problem, since the problem often results from a combination of these sources (that is, nutrients from urban and agricultural runoff, heavy metals from urban runoff and solid waste leachates). However, nonpoint source problems with bacteria, oxygen-demanding loads, pH, oil and grease, and toxics

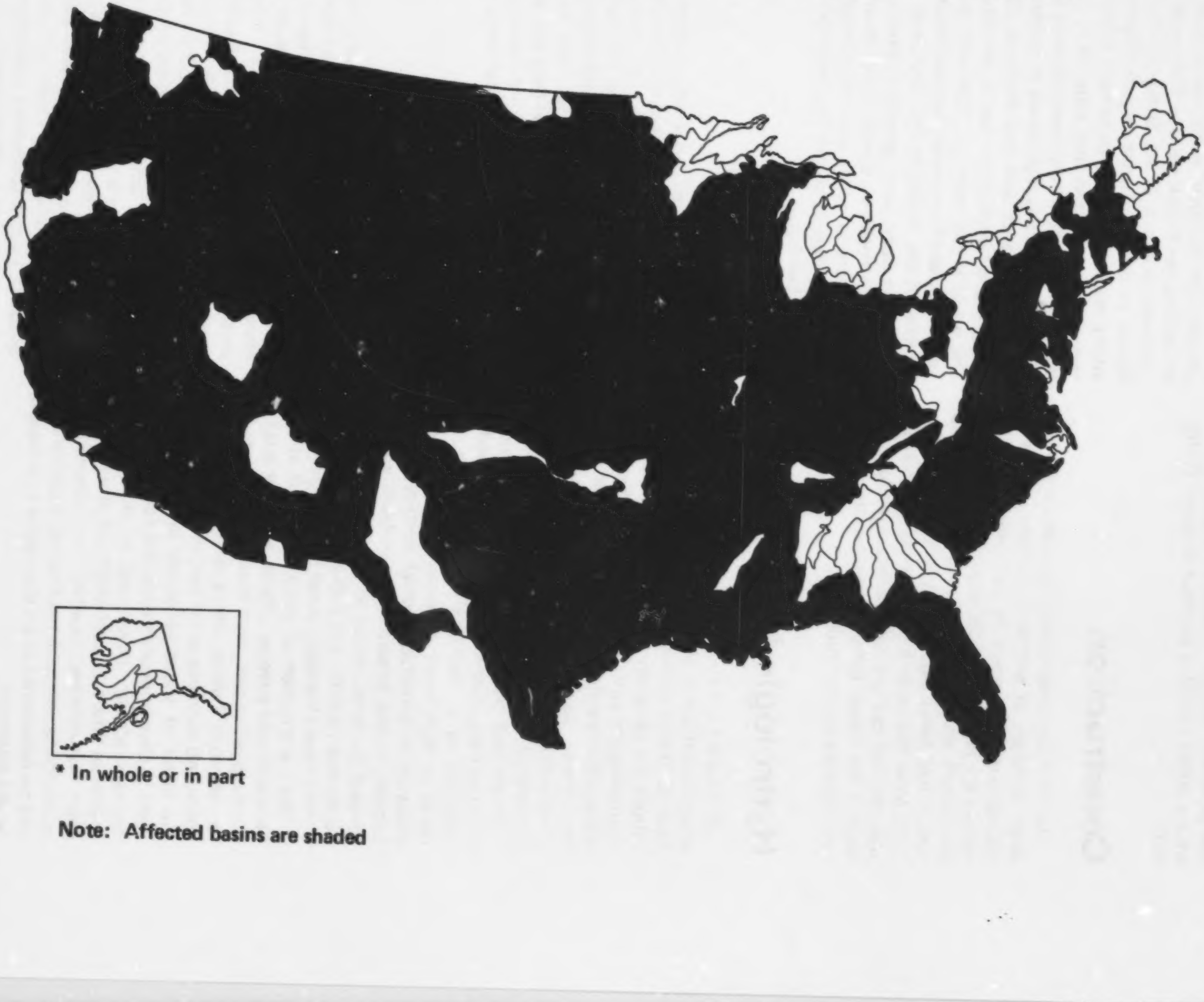
TABLE II-2

EFFECTS OF NONPOINT SOURCES OF POLLUTION

Region (Number of basins)	Percentage of Basins Affected* by Type of Pollution Problem from Nonpoint Sources								
	Bacteria	Oxygen depletion	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Toxics	Pesticides
Northeast (40)	70	53	63	65	10	18	15	3	18
Southeast (47)	66	74	57	34	4	9	4	11	23
Great Lakes (41)	51	54	44	56	27	37	20	34	15
North Central (35)	69	66	63	80	51	20	0	51	37
South Central (30)	53	43	63	37	70	23	3	47	40
Southwest (22)	36	14	45	32	68	14	14	27	0
Northwest (22)	64	18	55	64	14	9	5	32	0
Islands (9)	89	44	44	100	0	0	0	22	44
Total (246)	61	51	56	54	30	18	9	32	22

*In whole or part.

FIGURE II-1
BASINS AFFECTED* BY POLLUTION FROM AGRICULTURAL ACTIVITIES



* In whole or in part

Note: Affected basins are shaded

are generally more widespread in the regions where urban runoff is of major concern (Table II-2).

Construction

Runoff from construction sites can contribute large loadings of suspended solids and sediments to nearby waters. While many States discussed the potential problems from construction site runoff, only a few of them described areas which had been significantly impacted (Table II-1). Most States which discussed the problem also pointed out the control measures for containing the runoff before it reaches the stream are required at construction sites.

Hydrologic Modification

Problems from hydrologic modification result when alterations in stream flow patterns cause adverse effects on water quality. These modifications are generally in the form of stream bed channelization and dam construction. Excessive water withdrawals, while they can cause significant water quality degradation by reducing stream flow and assimilative capacity, are not considered in this discussion.

Steam bed channelization, which is done to maintain navigation channels, to reduce flooding potential, or to facilitate irrigation flows, can result in high levels of suspended solids and excessive sedimentation which destroys aquatic habitats in the stream. This problem was described in some detail in the Arkansas and Tennessee reports, and it affects many streams in the Lower Mississippi River Basin (Figure II-2).

The construction of dams can result in both beneficial and adverse effects on water quality. On the positive side, dam impoundments can act as retention basins where excess suspended solids and nutrients settle out, thereby reducing the levels of those pollutants in downstream waters. Dam impoundments also can be used to regulate stream flows and to maintain the minimum flow at a level which will provide sufficient assimilative capacity for downstream waste loads, although this flow regulation should not be considered as an alternative to adequate waste treatment.

On the other hand, in addition to other environmental damage, dams can cause serious water quality problems for two reasons. First, water descending over the dam spillways can become supersaturated with dissolved gases (oxygen and nitrogen) which can be fatal to fish by causing gas bubble disease. This problem is of particular concern in the Snake and Columbia Rivers in the Northwest region (Figure II-2), where the dams also act as barriers to the migratory runs of salmon and other fish. Second, water released from the lower portions of many reservoirs contains high levels of nutrients and suspended solids and low levels of dissolved oxygen and temperature due to stratification of the water in the reservoir. The poor quality of water released from reservoirs was described by several of the States in the Southeast region, where the dams were generally constructed to provide hydroelectric power. These downstream problems are in addition to the eutrophication that often occurs within the reservoir due to nutrient buildup.

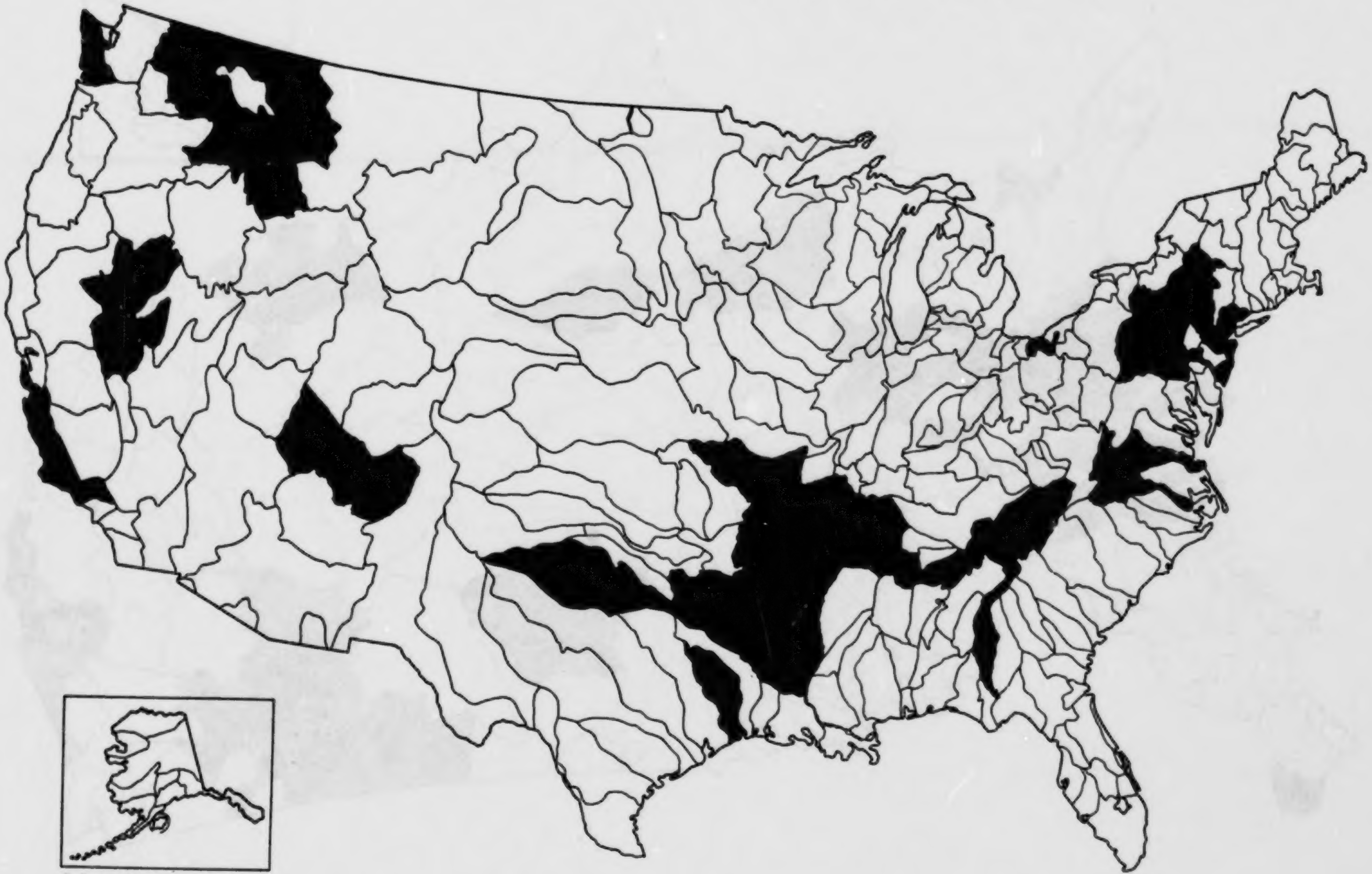
Silviculture

Forestry activities can result in severe erosion problems from logging roads and denuded areas on steep hillsides. Runoff from these areas causes high levels of suspended solids and excessive sedimentation. Oxygen-demanding loads, nutrients, and pesticides can also be carried along with the runoff. Widespread problems from silvicultural activities are found primarily in the Southeast and Northwest regions (Table II-1, Figure II-3).

Mining

Across the country, 30 percent of the basins are affected by runoff or drainage from active or abandoned mines (Table II-1, Figure II-4). In most areas, abandoned mines cause the most severe control problems, since today, active mining activities are generally regulated. The extent and type of problem varies considerably with geographic region. In the Ohio River basin portion of the Great Lakes region, mining activity is principally for coal. The most severe impact from coal mining is acid mine drainage, which is caused when exposed sulfur-bearing rock reacts with air and water to form sulfuric acid which then leaches or runs off into nearby streams. Excess suspended solids from [illegible] are also associated with coal mining. In the Great Lakes region, 41 percent of the basins are affected by mining activities, and acidity problems from nonpoint sources affect 37 percent of the

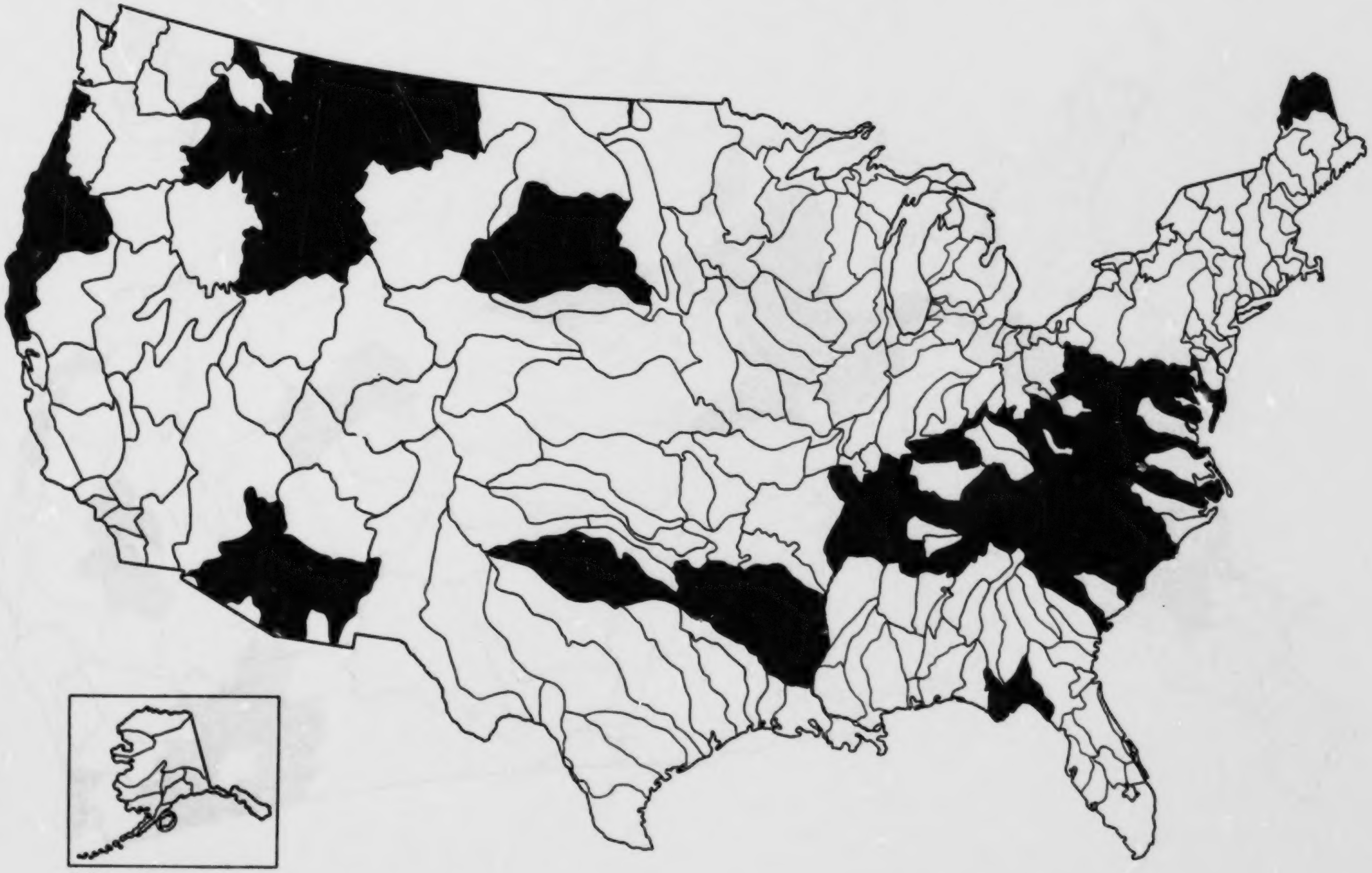
FIGURE II-2
BASINS AFFECTED* BY HYDROLOGIC MODIFICATIONS



* In whole or in part

Note: Affected basins are shaded

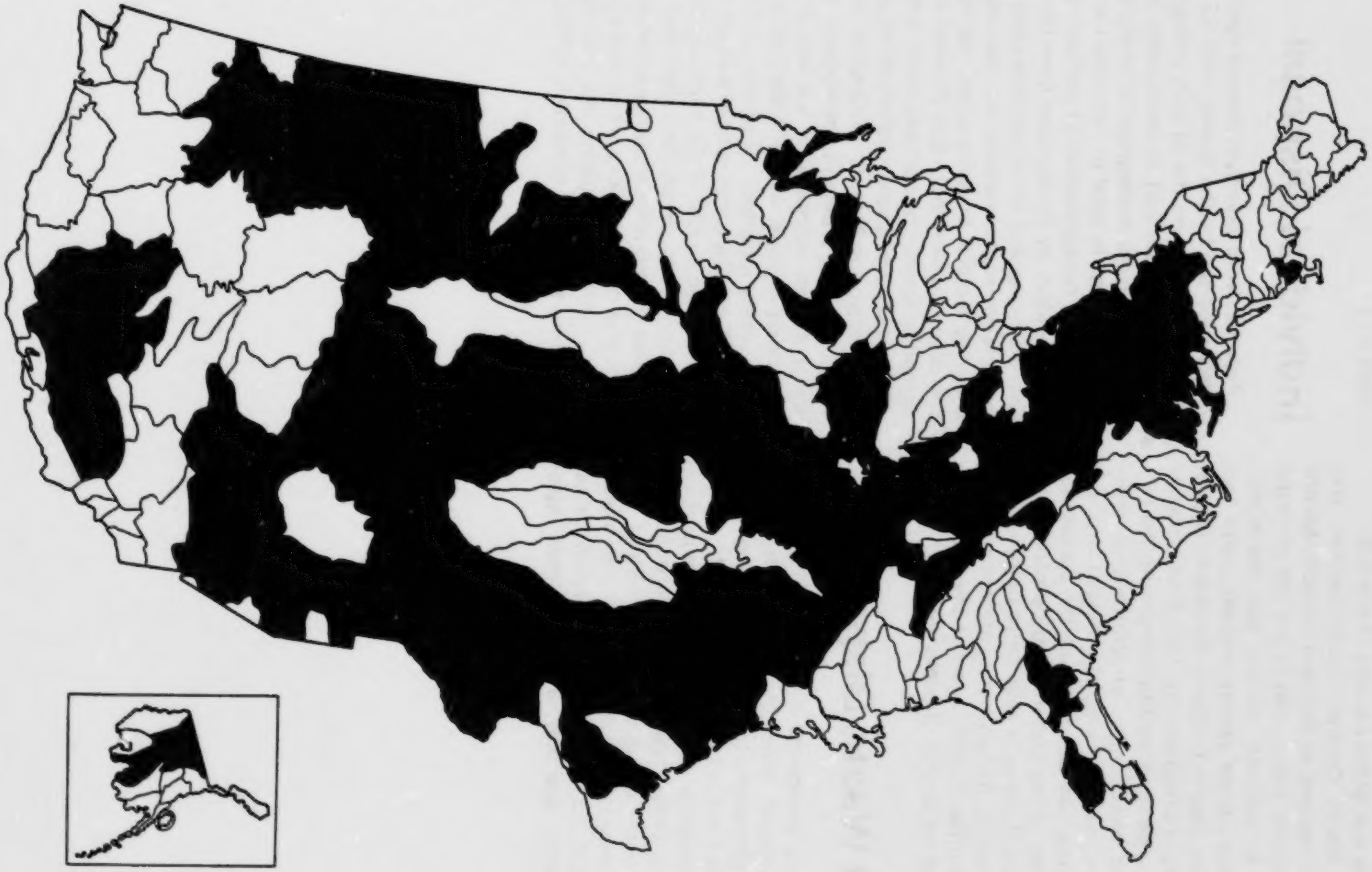
FIGURE II-3
BASINS AFFECTED* BY POLLUTION FROM SILVICULTURAL ACTIVITIES



* In whole or in part

Note: Affected basins are shaded

FIGURE II-4
BASINS AFFECTED* BY POLLUTION FROM MINING ACTIVITIES



* In whole or in part

Note: Affected basins are shaded

basins, which is more than double the percentage for the rest of the country (Table II-2).

In the North Central, South Central, and Southwest regions, which have considerable ore mining activity, heavy metals are the principal problem. In addition, oil and gas extraction, which often causes salinity problems, and coal mining take place in the South Central and North Central regions respectively. The effect of metals mining can be illustrated by comparing the percentage of basins with nonpoint source problems from toxics (principally metals) in these three regions (44 percent) with the percentage for the rest of the country (26 percent) Table II-2). This difference is even more notable since the regions with metals mining are less impacted overall by urban runoff, which is the other principal nonpoint source of heavy metals.

Solid Waste Disposal

Problems associated with pollution from solid waste disposal generally concern runoff or leaching of toxic materials such as heavy metals and PCBs from landfills or dumps into nearby surface waters and groundwaters. This problem is a potentially critical one; a groundwater aquifer, once polluted by a persistent toxic material, may take decades or even centuries to purge itself. To date, very little is known about this problem, and only in the Northeast region did a significant number of States discuss it (Table II-1).

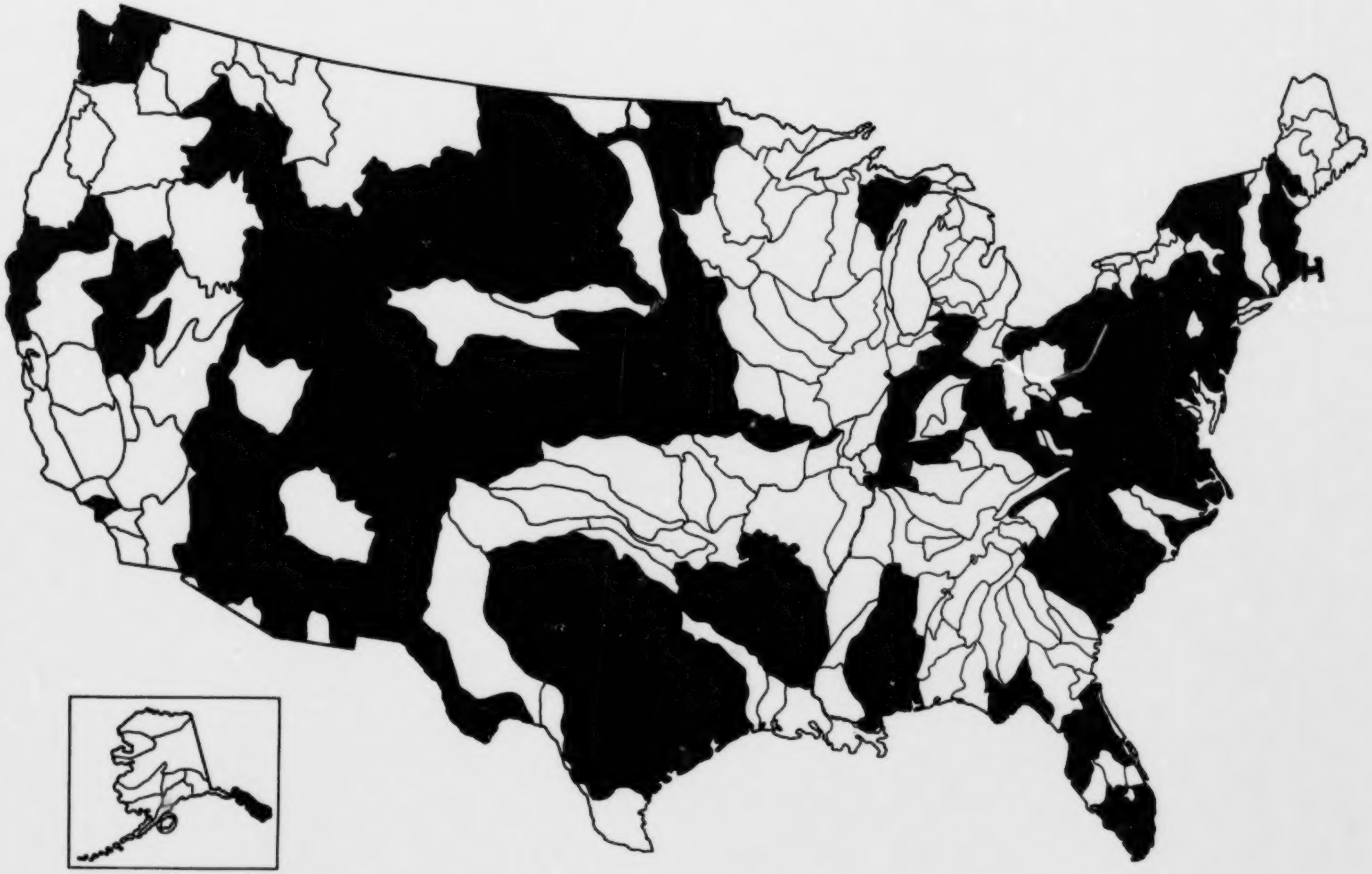
Individual Disposal

Pollution from individual disposal systems was widely reported by the States, with 43 percent of the basins across the country being affected (Table II-1, Figure II-5). In most cases, the problems result from inadequate or malfunctioning septic systems in rural or recreation areas with a resulting contamination of surface waters or groundwaters by the leachate from the system. Overcrowding and soil conditions which are not suitable for septic systems are also major contributing factors. In some cases, particularly in the Islands where individual disposal is a widespread problem, the contamination is the result of direct sewage discharges by individual homes.

The major pollutants associated with individual disposal problems are bacteria and, to a lesser extent, nutrients. In the Islands and the Northeast regions, where these problems were most widely reported, 73 percent of the basins were affected by bacteria from nonpoint sources as compared to 58 of the basins in the rest of the country. It should be noted that bacteria are also contributed by several other major nonpoint sources, including urban and agricultural runoff, so that evaluating the specific impact of individual disposal systems is difficult.

FIGURE II-5

BASINS AFFECTED* BY POLLUTION FROM INDIVIDUAL DISPOSAL SYSTEMS



* In whole or in part

Note: Affected basins are shaded

Chapter III

Water Pollution Control Programs

In December, 1977, Congress passed the Clean Water Act of 1977 (PL 95-217). This Act consisted primarily of a series of modifications to the 1972 Federal Water Pollution Control Act Amendments (PL 92-500), which had provided much of the impetus and direction for the recent substantial efforts in controlling water pollution. The 1977 Act did not alter the basic provisions of PL 92-500; instead it provided some shifts in emphasis and some procedural changes which the experiences of the State and Federal agencies in implementing the 1972 Act showed to be desirable.

Point Source Controls

Prior to PL 92-500, control of pollution sources was based on receiving water quality. Each State was required to adopt water quality standards for its waterways, and pollutant discharges were to be limited to the extent that those standards would be met. On the surface, this concept appears to be an economically efficient one, allowing water quality objectives to be met without utilizing resources for implementing overly stringent treatment requirements. However, in practice this approach can be very difficult to carry out. The technical problems of determining the pollutant load which a complex hydrological system can assimilate and then distributing or allocating that load to the often large number of municipal and industrial dischargers in the area can be enormous. Also, discharge limitations based on receiving water quality can cause widespread inequities among different plants within an industry and can lead to geographic dislocations of industrial plants.

For these and other reasons, in PL 92-500 Congress required all point source dischargers to meet effluent standards based on specific treatment technologies for each category of discharger. These requirements would apply regardless of receiving water quality, unless they were not stringent enough to allow the receiving stream to meet its water quality standards. In that case, more stringent controls would apply. Municipal dischargers were to achieve secondary treatment by 1977 and best practicable waste treatment technology (since defined as being equivalent to secondary treatment) by 1983. Industrial dischargers were to achieve best practicable control technology currently available (BPT) by 1977 and best available technology economically achievable (BAT) by 1983. In addition to imposing these requirements, Congress also authorized $18 billion for municipal sewage facility construction grants.

Despite some initial delays in awarding construction grants and in developing effluent guidelines, significant success was achieved in meeting the 1977 deadlines. Almost 90 percent of the industrial dischargers achieved BPT, while about one-third of the municipal dischargers achieved secondary treatment or better (the lower achievement percentage for municipalities is due in part to the generally larger size of the facilities involved, which often results in longer construction times). As treatment facilities were installed, concurrent improvements in water quality were noted (see the 1976 *National Water Quality Inventory*), due to the provisions of PL 92-500 and other State and Federal laws and regulations.

As the observed and projected water quality improvements due to the implementation of BPT

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and secondary treatment became realized, discussion arose regarding whether the higher level of technology-based industrial treatment requirements (BAT) was really needed. In a report and series of recommendations to Congress, the National Commission on Water Quality (NCWQ), which was authorized in PL 92-500, recommended that BAT implementation be postponed for five to ten years until the full effects of meeting BPT and secondary treatment requirements could be evaluated.

However, the recommendation that BAT be postponed came into direct conflict with the strategy the EPA had developed for controlling toxic pollutants. This strategy, described in the 1976 *National Water Quality Inventory*, relies on the use of BAT effluent guidelines to efficiently control large numbers of potentially harmful substances.

Also, there was some disagreement over the extent to which full implementation of BPT and secondary treatment would achieve the water quality goals of PL 92-500 with regard to conventional pollutants. The NCWQ believed that these requirements would achieve water quality objectives for all except a limited number of waterbodies, and that water quality standards could be used to achieve the goals in those areas. Information in the Commission staff report did indicate that almost all water would achieve minimum standards for dissolved oxygen after application of BPT and secondary treatment. However, another study from the Commission report indicated that BPT and secondary treatment alone would not allow many waters to support game fish populations, which are part of the balanced and indigeneous aquatic community that the Act is intended to protect or restore. This study indicates that going to BAT levels of treatment would significantly increase the numbers of areas suitable for game fish.

As a result of these and other considerations, including discussions presented in some of the State reports, the 1977 Act contained a number of compromises on controlling industrial discharges. The implementation of BAT for 65 toxic pollutants specified in the Act is required by July 1, 1984 (a one-year delay from PL 92-500). Additional toxic pollutants must have BAT controls implemented within three years of the date on which effluent guidelines for them are promulgated.The EPA was given greater flexibility in designating toxic pollutants, and was also given authority to regulate handling and disposal practices for those substances.

For conventional pollutants, initially defined as biological oxygen demand, suspended solids, fecal coliform, and pH, the 1977 Act requires that best conventional pollutant control technology (BCT) be implemented by July 1, 1984. Congress forsees BCT requirements as being no less stringent than BPT requirements and no more stringent than BAT requirements. Other pollutants may be designated as conventional pollutants by the EPA.

For all other pollutants, BAT must be implemented within three years of the date on which the limitations are established, or by July 1, 1984, whichever is later, but in no case later than July 1, 1987. For these pollutants, a discharger can obtain a modification of BAT requirements if he can demonstrate that his discharge will not cause any significant adverse water quality effects.

The 1977 Act also authorizes continued funding for the municipal sewage facilities construction grants program. The authorizations total an additional $24.5 billion through the 1982 fiscal year. In addition, the Act provides for continued funding of research on improved wastewater treatment and control systems.

Nonpoint Source Control

The processes of controlling pollution from nonpoint sources are not as well defined as are point source control processes. The 1972 and 1977 Acts leave the development and implementation of specific control regulations up to the State and local governments, recognizing that the effectiveness of different nonpoint source control methods, unlike point source controls, varies greatly from one type of area to another. To assist the States in developing nonpoint source control procedures, the EPA conducts research to provide improved methods for assessing and managing nonpoint source pollution and allocates grants to States and local governments under Section 208 of the Act. These grants are for development of areawide and Statewide water quality management plans, which are intended to coordinate and integrate both point source and nonpoint source controls to ensure that water quality objectives are achieved. Section 208 (j), which was added in the 1977 Act, authorizes the Department of Agriculture to provide grants for controlling agricultural pollution problems in areas or States with approved 208 plans.

The State have used various procedures for controlling nonpoint sources. For example, active mining operations are generally required to have discharge permits, as are irrigation return flows in some States. Several States have programs for reclaiming abandoned mining areas and reducing acid mine drainage. Control of pollution from mining activities will be strengthened considerably by the implementation of the Surface Mining Control and Reclamation Act of 1977.

Erosion control laws covering runoff from construction sites are common, as are regulations dealing with individual disposal systems. The States, in conjunction with the Department of Agriculture's Soil Conservation Service, have developed regulations or assistance programs to deal with soil erosion and runoff of other pollutants from agricultural and silvicultural areas. Detailed studies of urban runoff problems and prevention alternatives have been undertaken in a number of areas. Part of the purpose of the Section 208 Water Quality Management Plans is to assure that these various programs are adequately coordinated.

One of the parts of the 1972 and 1977 Acts which does provide specific authority in controlling nonpoint source problems is Section 404, which is designed to protect waters and wetlands from environmental degradation resulting from the discharge of dredged or fill material. Protecting these aquatic systems is a vital component of the overall water pollution control effort since these areas are highly productive ecosystems, provide fish and wildlife habitat, reduce flood damage, serve as storage basins, and serve other useful functions.

The dredge and fill program operates through a combination of case-specific permits and more general blanket permits or best management practices for certain, specified activities. Prior to passage of the 1977 Act, the issuance of permits was administered by the Corps of Engineers with technical support and review by the EPA, the Fish and Wildlife Service (FWS), and to a lesser extent other government agencies. The 1977 Act provides for a transfer of program authority to qualified States for those waters and wetlands other than actually navigable or tidal waters and their adjacent wetlands. In addition, the new law provides exemption from Section 404 permits for certain classes of activities, and for those major Federal projects which are specifically authorized by Congress and for which an appropriate environmental impact statement following EPA guidelines has been filed with the Congress. The EPA will retain an overview role and the FWS will retain an important review, comment, and assistance role even after transfer of the program to a State.

APPENDIX A

Pollution Problems and Sources by Hydrologic Basin

METHODOLOGY

The State reports were reviewed to determine what water quality information had been provided for each of the EPA designated hydrological drainage basins across the country (Figure A-1). Information was available for all basins except for a number of the smaller ones in the northern Great Lakes area and several others in Alaska. Because of the manner in which the States presented their findings, certain basins were combined so that the report provides summary data for 246 drainage basins as identified in Tables A-2 through A-9. These basins have been aggregated into eight geographic regions (Table A-1).

If one or more States identified a problem within any portion of a basin, that problem's cause and effect were checked in the appropriate columns in Tables A-2 through A-9. Problems were not checked if they were described as "minor" or insignificant"; however, identified problems do not necessarily mean that water quality standards were violated. This is because, for some parameters such as nutrients, standards do not generally exist, and because in some cases significant degradation, such as a sharp drop in dissolved oxygen levels, can occur and can affect aquatic life without violating standards.

It should be noted that, if a problem is not identified, that does not necessarily mean that the problem does not exist. In some cases, particularly with regard to toxic pollutants or for localized conditions, monitoring data may not be adequate to identify a problem. Also, the fact that a basin may not have any identified ambient water quality problems does not necessarily imply that all dischargers in that basin are meeting their permit requirements.

It is also important to recognize that the States used a number of different analytical methods and reporting formats in preparing and presenting their information. Therefore, that information can only be summarized qualitatively. As new guidance for these reports is developed for use by the States, it is expected that more precise national summaries will become possible.

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FIGURE A-1
EPA DESIGNATED HYDROLOGICAL DRAINAGE BASINS

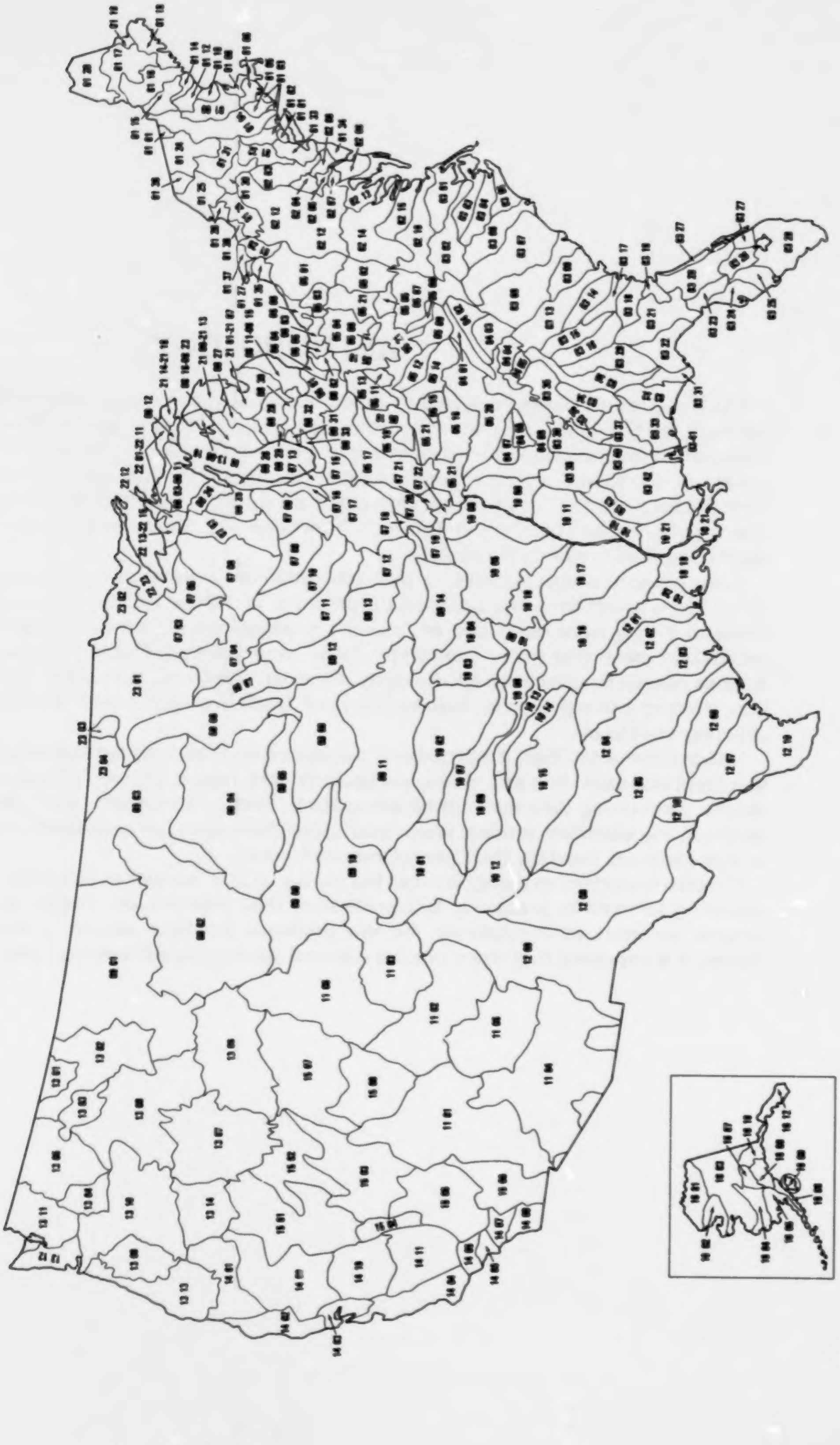


TABLE A-1
MAJOR RIVER BASINS WITHIN GEOGRAPHIC REGIONS

Region	Major Basins
Northeast	Northeast North Atlantic
Southeast	Southeast Tennessee River
Great Lakes	Great Lakes Ohio River
North Central	Upper Mississippi River Missouri River Hudson Bay
South Central	Lower Mississippi River Western Gulf of Mexico
Southwest	Colorado River Great Basin Southern California
Northwest	Pacific Northwest Alaska Northern California
Islands	Hawaii Puerto Rico Virgin Islands Pacific Territories

TABLE A-2
POLLUTION PROBLEMS
Region: Northeast (Northeast and North Atlantic Basins)

		Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
Basin code	Basin	Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
0101	Quinnipiac River and Western Connecticut Coastal	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓		✓						✓								
0102	Housatonic River		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓		✓				✓	✓	
0103	Pawcatuck River and Eastern Connecticut Coastal	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓									✓							✓	
0104	Connecticut River	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓					✓		✓	
0105	Thames River	✓	✓	✓	✓	✓						✓	✓	✓	✓				✓					✓					✓			✓
0106	Blackstone River	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓			✓	✓	✓	✓	
0108	Massachusetts Coastal		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓					✓	✓	✓	✓
0109	Merrimack River		✓	✓	✓	✓						✓	✓	✓	✓	✓	✓		✓				✓	✓					✓	✓	✓	
0110	Piscatagua River and New Hampshire Coastal		✓	✓		✓						✓	✓		✓																✓	
0112	Saco River and South Maine Coastal		✓	✓						✓		✓	✓		✓		✓														✓	
0114	Presumpscot River and Casco Bay		✓	✓								✓	✓																			
0115	Androscoggin River	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓									✓							✓	
0116	Kennebec and Sheepscot Rivers		✓	✓	✓	✓						✓	✓	✓	✓		✓							✓					✓			
0117	Penobscot River		✓	✓								✓	✓																			
0118	North Maine Coastal															✓		✓											✓			
0119	St. Croix River		✓	✓								✓																				
0120	St. John's River		✓	✓		✓						✓	✓		✓	✓	✓	✓									✓		✓			
0121	Lake Memphremanog		✓		✓	✓							✓																			
0124	Lake Champlain		✓	✓	✓	✓				✓		✓	✓		✓		✓	✓						✓							✓	
0125	St. Lawrence River			✓					✓	✓	✓	✓	✓				✓	✓		✓				✓							✓	✓
0126, 0136, 0137	Lake Ontario Shore, Oswego River to St. Lawrence River	✓		✓	✓					✓	✓	✓	✓									✓	✓						✓			✓
0127, 0135	Niagara River and Lake Erie Shore		✓	✓	✓					✓	✓	✓	✓		✓			✓						✓								
0128	Genesee River	✓	✓	✓	✓	✓						✓	✓	✓		✓		✓						✓					✓			
0129	Oswego River		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓						✓				✓				
0130	Mohawk River		✓	✓						✓	✓	✓	✓	✓			✓	✓						✓		✓						
	Upper and Middle Hudson River		✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓				✓	✓						✓	✓	✓	
0133	Lower Hudson River	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓		✓			✓	✓	✓	✓
0134	New Jersey Coast		✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓			✓		✓	✓		✓			✓		✓	✓
0138	St. Regis River		✓		✓							✓	✓		✓		✓														✓	

0203	Delaware River—Zone 1	✓	✓	✓	✓	✓						✓	✓		✓		✓	✓					✓	✓		✓			✓		✓	
0204	Lehigh River		✓	✓	✓	✓				✓		✓	✓							✓		✓						✓		✓		
0205	Schuylkill River	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓		✓		✓		✓	✓	✓
0206	Delaware River—Zone 2		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓					✓		✓	
0207	Delaware River—Zone 3		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓		✓					✓	✓	✓	
0208	Delaware River—Zone 4		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓				✓	✓	✓	
0212	Susquehanna River	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓		✓	✓	✓	✓	
0213	Upper Chesapeake Bay, Delaware-Maryland Coastal		✓	✓	✓				✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
0214	Potomac River		✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓		✓				✓	✓		✓	✓	✓		✓	✓
0215	Rappahannock and York Rivers, Virginia Coastal	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓				✓	✓	✓	✓	✓
0216	James River		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓		✓	✓	✓	✓

TABLE A-3
POLLUTION PROBLEMS
Region: Southeast (Southeast and Tennessee River Basins)

Basin code	Basin	Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
		Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
0301	Chowan River		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓						✓						✓		✓	✓
0302	Roanoke River	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓		✓	✓		✓		✓	
0303	Tar River		✓	✓	✓			✓		✓	✓	✓	✓		✓	✓		✓	✓								✓				✓	✓
0304	Neuse River		✓	✓	✓		✓			✓	✓	✓	✓		✓	✓	✓	✓				✓		✓					✓			
0305	North Carolina Coast		✓	✓									✓		✓		✓	✓						✓					✓		✓	
0306	Cape Fear River		✓	✓	✓	✓	✓			✓		✓	✓			✓	✓	✓				✓		✓			✓		✓			
0307	Yadkin-Pee Dee River		✓	✓	✓			✓		✓		✓	✓		✓	✓	✓	✓						✓			✓		✓		✓	
0308	Catawba-Wateree, Congaree Rivers	✓	✓	✓	✓					✓	✓	✓	✓		✓	✓	✓	✓			✓		✓	✓			✓		✓		✓	
9	Edisto-Combakee River		✓	✓							✓	✓	✓		✓	✓								✓					✓		✓	
0313	Savannah River		✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓						✓		✓	✓		✓		✓	
0314	Ogeechee River																															
0315	Oconee River		✓	✓	✓								✓			✓										✓						
0316	Ocmulgee River		✓	✓	✓							✓	✓	✓	✓	✓								✓								
0317	Altamaha River																															
0318	Satilla River			✓									✓																			
0319	St. Mary's-Nassau River		✓	✓	✓							✓	✓		✓	✓	✓							✓					✓			
0320	St. John's River		✓	✓	✓	✓						✓	✓		✓	✓	✓	✓						✓					✓		✓	
0321	Suwannee River		✓	✓	✓							✓	✓		✓	✓	✓			✓				✓				✓	✓			
0322	Ochlockonee-St. Mark's River		✓	✓	✓							✓	✓		✓	✓	✓	✓						✓			✓		✓		✓	
0323	Withlacoochee River		✓	✓	✓							✓	✓		✓	✓	✓												✓		✓	
0324	Tampa River		✓	✓	✓							✓	✓		✓	✓	✓							✓				✓	✓		✓	
0325	Peace River		✓	✓	✓							✓	✓		✓	✓	✓							✓				✓	✓			
0326	Kissimmee River		✓	✓	✓							✓	✓		✓	✓	✓							✓					✓			
0327	Florida East Coast			✓	✓								✓			✓	✓							✓					✓			
0328	Lower Florida Area		✓	✓	✓							✓	✓		✓	✓	✓							✓					✓		✓	
0329	Flint River		✓	✓	✓							✓	✓		✓	✓	✓							✓								
0330	Chattahoochee River		✓	✓	✓							✓	✓	✓	✓	✓	✓							✓		✓						
0331	Apalachicola River				✓								✓				✓										✓		✓		✓	
0332	Choctawhatchee River		✓	✓	✓							✓	✓		✓	✓	✓							✓					✓			

0333	Perdido-Escambia River		✓	✓	✓							✓	✓		✓	✓	✓							✓					✓			
0334	Tallapoosa River		✓	✓	✓	✓						✓	✓																			
0335	Coosa River		✓	✓	✓						✓	✓	✓	✓	✓	✓	✓							✓								
0336	Cahaba River			✓								✓	✓																			
0337	Alabama River																															
0338, 0340	Tombigbee River		✓	✓	✓	✓		✓					✓		✓	✓							✓						✓		✓	
0339	Warrior River			✓								✓	✓							✓								✓				
0341	Mobile Bay			✓								✓			✓								✓						✓		✓	
0342	Pasacagoula River		✓	✓	✓	✓					✓	✓	✓		✓								✓						✓		✓	
0343	Pearl River			✓									✓		✓	✓							✓						✓		✓	
0401	Clinch River	✓	✓	✓		✓		✓		✓	✓	✓	✓			✓		✓		✓		✓		✓		✓	✓	✓		✓		
0402	Holston River	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓		✓	✓	✓	
0403	French Broad River		✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓					✓	✓	✓	✓	✓	✓		✓		
0404	Little Tennessee River		✓										✓			✓		✓								✓	✓					
0405	Hiwassee River		✓	✓								✓	✓			✓		✓								✓	✓					
0406	Elk River			✓									✓			✓							✓						✓			
0407	Duck River		✓	✓	✓	✓			✓	✓		✓	✓																			
0408	Tennessee River Mainstem	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		

TABLE A-4
POLLUTION PROBLEMS
Region: Great Lakes (Great Lakes and Ohio River Basins)

		Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
Basin code	Basin	Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
0501	Allegheny River		✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓				✓		✓	✓	
0502	Monongahela River	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓		✓		✓		✓		✓			✓	✓			✓	
0503	Beaver River		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓
0504	Muskingum River	✓	✓	✓			✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓						✓		✓		
0505	Little Kanawha River		✓		✓	✓			✓		✓	✓	✓		✓			✓						✓				✓				
0506	Hocking River		✓	✓									✓						✓	✓	✓							✓				
0507	Kanawha River	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓			✓	✓			✓	
0508	Guyandot River		✓	✓	✓	✓			✓			✓	✓					✓										✓				
0509	Big Sandy River		✓	✓									✓					✓	✓	✓							✓	✓	✓	✓	✓	
0510	Scioto River	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					✓			
0511	Little Miami River			✓	✓			✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓		✓					✓		✓	
0512	Licking River		✓	✓								✓	✓			✓		✓	✓				✓		✓			✓	✓		✓	
0513	Miami River	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓				✓	✓		✓	
0514	Kentucky River		✓	✓									✓			✓		✓	✓	✓		✓		✓				✓	✓			
0515	Salt River		✓	✓								✓	✓					✓									✓		✓			
0516	Green River		✓	✓								✓	✓					✓	✓	✓				✓				✓	✓			
0517	Wabash River		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓							✓					✓		✓	
0518, 0519	White River	✓	✓	✓	✓		✓					✓	✓				✓							✓					✓			
0520	Cumberland River	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓				✓	✓		✓	✓	✓	✓		
0521	Ohio River Mainstem	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
0601	Maumee River		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓						✓					✓			
0602	Sandusky River		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓		✓						✓					✓		✓	
0603	Cuyahoga River		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓			✓		✓	
0604	Lake Erie, Maumee River to Sandusky River		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓					✓			
0605	Lake Erie, Sandusky River to Cuyahoga River		✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓							✓					✓		✓	
0606	Lake Erie, Cuyahoga River to New York State Line	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓			✓	✓	✓		✓						✓	✓		✓	
0611	Raisin River				✓					✓		✓	✓																			
0613	Detroit River		✓	✓	✓			✓	✓		✓	✓	✓	✓																		
0614	Clinton River				✓								✓																			

0803, 0824	Menominee River, Western Green Bay			✓		✓				✓		✓	✓			✓	✓	✓											✓		✓	
0814	Pine River		✓	✓							✓	✓	✓																			
0816	Boardman River				✓								✓																			
0825	Fox River and Wolf Creek		✓	✓	✓	✓					✓	✓	✓		✓	✓	✓							✓					✓			
0826	Western Lake Michigan	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓					✓			✓
0827	Muskegon River			✓	✓								✓																			
0828	Grand River																															
0832	St. Joseph River		✓	✓	✓		✓		✓	✓		✓	✓			✓	✓						✓						✓		✓	
0849	Calumet-Burns Ditch Complex		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓						✓		✓								✓
2104	Saginaw River		✓	✓	✓				✓		✓	✓	✓				✓												✓			
2108	AuSable River																															
2223	Lake Superior (Wisconsin and Minnesota)		✓	✓		✓				✓	✓	✓	✓					✓				✓						✓				

TABLE A-5
POLLUTION PROBLEMS
Region: North Central (Upper Mississippi, Missouri, and Hudson Bay Basins)

Basin code	Basin	Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
		Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
0703	Upper Mississippi River (upper portion)		✓	✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓					✓			
0704	Minnesota River		✓	✓		✓				✓		✓	✓		✓	✓	✓	✓											✓			
0705	St. Croix River																															
0706	Upper Mississippi River (lower portion)		✓	✓	✓	✓				✓	✓	✓	✓		✓	✓	✓	✓	✓					✓					✓			
0707	Wisconsin River		✓	✓	✓	✓				✓		✓	✓			✓	✓	✓				✓						✓	✓			
0708	Mississippi-Wapsipinicon and Tributaries		✓	✓	✓		✓			✓		✓	✓		✓	✓	✓	✓	✓			✓	✓					✓	✓			
0709	Rock River		✓	✓	✓					✓		✓	✓		✓	✓		✓				✓							✓			
0710	Mississippi-Cedar-Iowa Rivers	✓	✓	✓	✓					✓		✓	✓		✓		✓		✓				✓	✓					✓			
0711	Mississippi-Des Moines-Skunk Rivers	✓	✓	✓	✓	✓				✓		✓	✓		✓	✓	✓	✓	✓			✓	✓	✓					✓			
0712	Mississippi-Salt Rivers		✓	✓	✓			✓		✓	✓	✓	✓		✓	✓	✓	✓				✓	✓	✓					✓			
0713	Chicago-Calumet Reservoir-Des Plaines River	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓			✓		✓					✓	✓		
0715	Kankakee River		✓							✓		✓	✓			✓		✓				✓		✓					✓			
0716	Fox River		✓	✓	✓					✓		✓	✓		✓	✓	✓	✓				✓	✓	✓					✓			
0717	Illinois River		✓	✓	✓			✓		✓		✓	✓			✓		✓		✓		✓	✓	✓				✓	✓			
0718, 0719, 0722	Mississippi River—St. Louis, Cape Girardeau		✓	✓	✓		✓			✓	✓	✓	✓		✓	✓		✓				✓	✓	✓				✓	✓			
0720	Kaskaskia River		✓	✓	✓					✓		✓	✓					✓				✓	✓	✓				✓	✓			
0721	Big Muddy River		✓	✓	✓		✓	✓		✓		✓	✓					✓		✓		✓		✓				✓	✓			
0901	Upper Missouri River to Milk River		✓		✓								✓				✓	✓	✓	✓		✓					✓	✓	✓			
0902	Yellowstone River		✓	✓	✓						✓	✓	✓		✓	✓	✓	✓	✓			✓						✓	✓		✓	
0903	Missouri River, Milk River to Spring Creek		✓										✓		✓			✓	✓										✓		✓	
0904	Missouri River, Spring Creek to Niobara River		✓	✓	✓	✓				✓	✓	✓	✓		✓	✓	✓	✓	✓			✓		✓	✓		✓	✓	✓	✓	✓	
0905	Niobara River														✓														✓			
0906	James River		✓	✓	✓							✓	✓		✓	✓	✓	✓	✓										✓			
0907	Big Sioux River		✓	✓	✓	✓				✓		✓	✓		✓	✓	✓		✓				✓						✓		✓	
0908	Platte River below North Platte River		✓	✓	✓		✓					✓	✓		✓	✓	✓	✓	✓				✓	✓					✓		✓	
0909	North Platte River		✓	✓	✓		✓						✓		✓		✓	✓	✓										✓			
0910	South Platte River		✓	✓	✓							✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓	✓	✓	
0911	Kansas River		✓	✓	✓							✓	✓		✓	✓	✓	✓	✓					✓				✓	✓		✓	
0912	Missouri River below Niobara River	✓	✓	✓	✓		✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓				✓	✓		✓	
0913	Grand-Chariton Rivers		✓	✓	✓								✓		✓		✓	✓		✓			✓	✓				✓	✓		✓	
0914	Orange-Gasconade Rivers		✓	✓	✓								✓		✓	✓	✓	✓	✓	✓		✓		✓		✓		✓	✓			
2301	Red River of the North		✓	✓		✓				✓		✓	✓		✓	✓	✓	✓	✓	✓									✓		✓	
2302	Rainy River		✓	✓								✓																				
2303	Devil's Lake																															
2304	Souris River																															

TABLE A-6
POLLUTION PROBLEMS
Region: South Central (Lower Mississippi and Western Gulf Basins)

		Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
Basin code	Basin	Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
1001	Arkansas River above Kansas-Colorado State Line		✓	✓	✓							✓	✓		✓			✓	✓			✓		✓				✓	✓		✓	
1002	Arkansas River, Kansas-Colorado State Line to Tulsa		✓	✓	✓		✓					✓	✓		✓		✓	✓	✓			✓						✓	✓			
1003	Verdigris River				✓		✓			✓		✓	✓		✓		✓							✓					✓			
1004	Grand Neosho River		✓	✓	✓					✓		✓	✓		✓				✓			✓		✓				✓	✓	✓		
1005	White River	✓	✓	✓	✓	✓			✓	✓		✓	✓			✓	✓	✓				✓	✓			✓		✓	✓			
1006	Mississippi River, Cairo to Helena		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓				✓	✓	✓		✓	✓	✓	✓	✓		
1007	Cimarron River			✓	✓	✓				✓		✓	✓		✓				✓			✓		✓					✓			
1008	North Canadian River				✓	✓				✓		✓	✓				✓	✓				✓		✓								
1009	Arkansas River, Tulsa to Van Buren			✓	✓		✓			✓		✓	✓				✓					✓		✓								
1010	Arkansas River below Van Buren		✓	✓	✓								✓		✓	✓	✓	✓					✓	✓		✓			✓		✓	
1011	Yazoo River			✓	✓			✓					✓				✓	✓		✓			✓					✓	✓			
1012, 1013	South Canadian River		✓	✓	✓								✓		✓		✓		✓										✓			
1014	Washita River				✓	✓							✓				✓		✓			✓		✓					✓			
1015	Upper Red River		✓	✓	✓					✓		✓	✓		✓	✓	✓		✓			✓				✓	✓		✓		✓	
1016	Lower Red River		✓	✓	✓							✓	✓		✓	✓	✓	✓	✓				✓	✓		✓	✓	✓	✓		✓	
1017	Ouachita River		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓		✓	
1018	Big B'ack River		✓	✓									✓																			
1019	Atchafalaya River			✓								✓	✓			✓	✓		✓										✓			
1020	Calcasieu River		✓	✓								✓	✓			✓			✓										✓			
1021	Mississippi River below Natchez		✓	✓	✓							✓	✓			✓			✓	✓			✓						✓			✓
1201	Sabine River		✓	✓	✓	✓				✓		✓	✓			✓		✓	✓			✓	✓	✓				✓	✓			
1202	Neches River		✓	✓	✓	✓	✓					✓	✓		✓	✓				✓				✓		✓		✓	✓		✓	
1203	Trinity River		✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓				✓	✓	✓	✓	
1204	Brazos River		✓	✓	✓		✓			✓		✓	✓		✓	✓	✓		✓	✓	✓		✓					✓	✓		✓	
1025	Colorado River		✓	✓	✓								✓				✓		✓			✓		✓				✓	✓	✓	✓	
1206	Guadelupe Lavaca and San Antonio Rivers		✓	✓	✓								✓				✓		✓				✓						✓		✓	
1207	Nueces River		✓										✓		✓	✓	✓		✓	✓								✓	✓		✓	
1208	Pecos River			✓	✓		✓					✓	✓						✓									✓				
1209	Upper Rio Grande		✓	✓	✓					✓		✓	✓		✓				✓			✓						✓	✓		✓	
1210	Lower Rio Grande		✓	✓									✓						✓										✓			

TABLE A-7
POLLUTION PROBLEMS

Region: Southwest (Colorado River, Central and Southern California, and Great Basins)

Basin Code	Basin	Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
		Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Cxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
1101	Lower Colorado River		✓	✓	✓			✓	✓	✓		✓	✓		✓		✓	✓	✓		✓	✓		✓				✓	✓		✓	
1102	Middle Colorado and San Jaun Rivers		✓										✓		✓				✓			✓				✓		✓	✓		✓	
1103	Upper Colorado River		✓	✓									✓		✓				✓			✓						✓	✓		✓	
1104	Gila River		✓	✓	✓								✓		✓		✓	✓	✓	✓		✓		✓			✓	✓	✓		✓	
1105	Little Colorado River																															
1106	Green River		✓	✓		✓						✓	✓		✓		✓	✓	✓									✓	✓		✓	
1120-1129	Dead Basins																															
1404	Central Coastal				✓		✓						✓				✓		✓							✓			✓			
1405	Santa Clara River																✓		✓							✓			✓			
1406	Los Angeles River			✓									✓				✓														✓	
1407	Santa Ana River		✓		✓	✓	✓			✓	✓	✓	✓				✓	✓	✓										✓			
1408	San Diego Coastal		✓		✓								✓				✓												✓			
1410	San Joaquin River			✓	✓								✓			✓	✓		✓	✓		✓						✓	✓			
1411	King and Kerns Rivers, Tulare Lake																		✓									✓	✓			
1501	Northwestern Lahontan	✓	✓		✓	✓	✓					✓	✓		✓	✓		✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	
1502	Humboldt River						✓						✓						✓					✓					✓			
1503	Central Nevada																															
1504	Owens River																															
1505	Mojave River																															
1506	California Portion of Colorado River		✓	✓	✓		✓						✓						✓										✓			
1507	Great Salt Laker		✓	✓	✓								✓		✓	✓	✓	✓	✓		✓			✓					✓		✓	
1508	Sevier River		✓									✓			✓			✓	✓										✓			

TABLE A-8
POLLUTION PROBLEMS
Region: Northwest (Pacific Northwest, Northern California, and Alaska Basins)

		Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
Basin code	Basin	Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
1301	Kootenai River																	✓				✓			✓	✓						
1302	Clark Fork, Pend Oreille River		✓	✓	✓								✓		✓	✓	✓	✓				✓			✓	✓	✓	✓	✓			
1303	Spokane River		✓	✓	✓					✓		✓	✓	✓						✓		✓						✓				
1304	Yakima River		✓	✓	✓							✓	✓		✓	✓	✓	✓	✓										✓			
1305	Columbia River above Yakima River																					✓				✓						
1306	Upper Snake River		✓		✓	✓					✓	✓	✓		✓		✓	✓				✓		✓	✓		✓		✓		✓	
1307	Central Snake River		✓	✓	✓							✓	✓		✓		✓	✓											✓			
1308	Lower Snake River		✓	✓	✓							✓	✓		✓		✓	✓				✓				✓	✓	✓	✓		✓	
1309	Willamette River		✓	✓	✓	✓						✓	✓		✓			✓											✓			
1310	Columbia River below Yakima River														✓		✓	✓											✓			
1311	Puget Sound		✓	✓	✓	✓					✓	✓	✓	✓	✓		✓				✓			✓					✓	✓	✓	✓
1312	Washington Coast		✓	✓	✓						✓	✓	✓		✓		✓	✓						✓		✓			✓	✓	✓	
1313	Oregon Coast		✓										✓		✓	✓		✓						✓			✓		✓			
1401	Klamath River														✓		✓	✓							✓		✓				✓	
1402	Northern California Coastal		✓		✓							✓	✓		✓		✓	✓							✓		✓				✓	
1403	San Francisco Bay		✓	✓	✓		✓						✓	✓	✓		✓		✓					✓					✓			
1409	Sacramento River				✓								✓				✓	✓	✓	✓		✓						✓	✓			
1603	Yukon River		✓										✓					✓										✓				
1605	Bristol Bay, Nuskagak and Mulchatna River			✓		✓						✓																				
1608	Kenai and Knik Arm Rivers																															
1609	Kodiak Island		✓	✓		✓						✓	✓																			
1612	Southeastern Alaska		✓	✓				✓				✓	✓		✓	✓															✓	

TABLE A-9
POLLUTION PROBLEMS
Region: Islands

		Point Sources													Nonpoint Sources																	
		Type of Problem										Source			Type of Problem									Source								
Basin code	Basin	Thermal	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals	Non-metal toxics	Industrial	Municipal	Combined sewer	Bacteria	Oxygen demand	Nutrients	Suspended solids	Dissolved solids	pH	Oil and grease	Heavy metals, toxics	Pesticides	Urban runoff	Construction	Hydrologic modification	Silviculture	Mining	Agriculture	Solid waste disposal	Individual disposal	Other or undefined
1701	Hawaii	✓		✓		✓			✓			✓	✓		✓			✓							✓				✓		✓	
1702	Oahu	✓	✓	✓		✓			✓	✓	✓	✓	✓		✓			✓				✓	✓	✓	✓				✓		✓	✓
1703	Kauai		✓	✓								✓	✓		✓			✓						✓	✓	✓			✓		✓	
1704	Maui	✓	✓						✓			✓	✓					✓					✓	✓	✓	✓			✓			
1800	Puerto Rico		✓	✓	✓		✓			✓		✓	✓		✓	✓	✓	✓					✓	✓					✓		✓	
1900	Virgin Islands		✓	✓	✓							✓	✓		✓	✓	✓	✓						✓	✓						✓	✓
2001	Guam		✓	✓	✓							✓	✓		✓	✓	✓	✓						✓					✓	✓	✓	
2002-2007	Trust Territory of the Pacific Islands		✓		✓								✓		✓		✓	✓				✓			✓				✓	✓	✓	✓
2008	American Samoa		✓	✓	✓	✓			✓			✓	✓		✓	✓		✓													✓	

APPENDIX B

Excerpts From 1977 State and Jurisdictional Reports

Appendix B provides excerpted summary (if available) or introductory sections from the 1977 reports submitted by the States and other jurisdictions. The reader can obtain more complete information by writing to the applicable agency listed with the report excerpt.

State of Alabama

Complete copies of the State of Alabama 305(b) Report can be obtained from the Agency listed below:

Alabama Water Improvement Commission
State Office Building
Montgomery, AL 36104

Introduction

Alabama's 1976 water quality report to Congress will essentially parallel the same format used in the 1975 water quality report.

As stated in the 1974 water quality report to Congress, the Alabama Water Improvement Commission originally established 53 trend or permanent stations which could be used as a continuing data source to detect positive or negative trends in water quality. This number was increased to 59 stations in 1975 and was continued at this level in 1976.

Although over 21 chemical-physical parameters are currently measured at each station, this report is limited to the consideration of four basic parameters which are common to the State's criteria for all water use classifications, i.e., water temperature, dissolved oxygen, turbidity, and pH. A fifth parameter, biochemical oxygen demand (BOD) is also included since it is indicative of organic pollutional loading.

Fish condition factors (Kn) for selected stations were again incorporated in the 1976 report.

Also included in this report is a brief summary of the Commission's efforts in the monitoring for polychlorinated biphenyls (PCBs) in fish samples collected from Weiss Lake, an impoundment of the Coosa River in Northeast Alabama. A high priority was given to this monitoring as a result of the discovery of elevated PCB concentrations in fish collected from the Coosa River below Rome, Georgia.

Water Quality

Trend station data collected in 1976 were compared to data collected in 1974 and 1975. An increase of 20.8 percent of stations meeting current water quality objectives was experienced in 1976 as compared to 1975. In 1975, 43.6 percent of the trend stations met water quality objectives while 64.4 percent met objectives in 1976. This improvement in water quality will be covered in various sections of this report.

Many of the trend stations in Alabama were chosen to monitor specific problem areas in the State, and the data collected at these locations cannot be used to evaluate water quality on a statewide basis. The effectiveness of pollution abatement control should be reflected as a gradual increase in the quality of water at these stations. Additional trend stations have been added to the Alabama network, and most of those added were found to meet water quality objectives in 1976.

At the conclusion of 1976, the State of Alabama had 8,925 miles of classified waters. In excess of 96 percent of these waters had classifications indicative of water quality equal to a greater than that necessary to protect fish and aquatic life.

Although there appears to be a vast improvement in water quality from 1975 to 1976, insufficient data have been collected thus far to predict any long-term trends. As the 1975 report stated, approximately five to ten years of data will be necessary to produce data which can be used to provide statistical evidence of improved water quality.

Figure 1 shows the total number of trend stations and stations meeting water quality objectives.

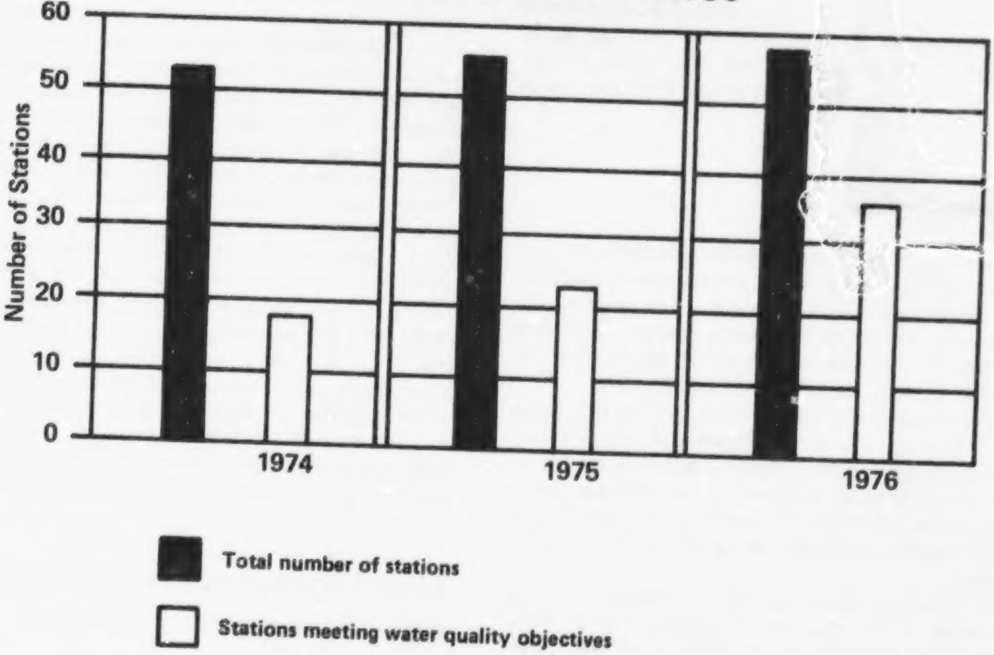
Nonpoint Source Pollution

The primary objective of the Commission is to deal with point source pollution. Poor water quality resulting from nonpoint source pollution has not received a great amount of study.

Designated areas for the Section 208 planning process are well under way and are expected to reveal areas of nonpoint sources and also to provide costs associated for the attainment of water quality goals where control of nonpoint source pollution is involved. The statewide Section 208 planning process was assumed by the Commission in 1976 and is expected to provide needed information outside the designated Section 208 project areas.

FIGURE 1

WATER IMPROVEMENT COMMISSION TREND MONITORING STATIONS AND WATER QUALITY STATUS



NOTE: Trend stations were chosen to monitor problem areas in the State and data obtained at these stations are not indicative of the overall status of the water quality in the State.

Silviculture

Forest practices guidelines were adopted in 1975 and were continued in 1976 in an effort to address water quality problems involved in silvicultural-type operations. In conjunction with these guidelines, the Commission instigated a program beginning in the summer of 1975, and carrying through the entire year of 1976, in an effort to generate data which will be helpful in gaining some insight into problems associated with silvicultural operations. This program is anticipated to continue through 1978.

The Commission has also joined with the State Forestry Commission in initiating a statewide educational program designed to make use of radio, television, newspapers, and training sessions in an effort to educate all concerned with best management practices in the silviculture area.

Construction

All State Highway projects which cross State streams or rivers are reviewed by the Commission's staff during the early planning stages. Recommendations and suggestions are offered in an effort to mitigate potential water quality problems which could result from restricted circulation due to highway construction.

The Commission also works jointly with the U.S. Army Corps of Engineers to review all construction activities, including dredge and fill projects which may result in a discharge into State waters. Each project applicant must obtain a water quality certification from the Commission before a Federal permit can be issued by the Corps of Engineers.

All review processes are performed to ensure that any construction in or contiguous to the waters of the State will not violate applicable water quality standards either during construction or as a result of construction.

PCBs and Mercury

In 1976, the Commission continued to monitor levels of mercury in fish and sediment samples collected in the Mobile delta. At the present time, mercury levels are continuing to remain fairly constant since the ban on commercial fishing was lifted in 1972.

In the late summer of 1976, the Commission's attention was directed toward PCB concentrations in fish from the Coosa River following the discovery of high PCB concentrations in fish collected below Rome, Georgia. The General Electric Company's plant at Rome, which began operation about 1954, is the known source of PCBs to the environment in the Rome area according to information furnished by Georgia's Department of Natural Resources.

In August 1976, the Commission's technical staff collected fish samples from Weiss Lake and, in October, established a routine monitoring program in the lake. Fish samples collected from three locations in Lake Weiss (Alabama-Georgia state line, Cedar Bluff, and above the dam) revealed higher values in commercial species and lower values in gamefish. Thirty-seven pieces of data collected in August, September, and October can be categorized as that applicable to gamefish, commercial species, and a combination of gamefish and commercial species. These data were derived by compositing the fish samples to produce the average concentrations which were reported. Six of twenty-one values applicable to game species exceeded the FDA tolerance limit of 5 ppm, eleven of thirteen values applicable to commercial species exceeded the limit, while none of the three values applicable to a combination of game and commercial species exceeded the limit.

After reviewing the data, the State Health Department issued an advisory that "those taking fish from the Weiss Reservoir should be aware that most recent analysis of some fish samples from the area had revealed concentrations of PCBs considerably in excess of the 5.0 ppm recommendation promoted by the Federal Food and Drug Administration, and individuals should adjust their consumption accordingly".

The Commission will continue to monitor PCB levels in fish collected from Weiss Lake, and analytical results generated by this effort will be forwarded to appropriate governmental agencies for their information and use.

Fish Mortality Associated With Nonpoint Source Pollution

During 1976, thirty fish kills were investigated by the Commission's staff. Of this number, three were attributable to nonpoint source pollution (Table 1), while during 1974 and 1975, eleven and seven fish kills respectively were attributable to this same cause. The reduction for 1976 is manifested in the continued reduction of the number of pesticide-related kills, and it is considered to be indicative of an increased awareness by commercial applicators of the problems which can result with the careless use of economic poisons. As the users of these economic poisons become more aware of the hazards involved, it is hoped the number of pesticide-related fish kills will be drastically reduced, if not completely eliminated.

TABLE 1
SUMMARY OF 1976 FISH KILLS BY RIVER BASIN AND CAUSE

	Number	Suspected Pesticides	Industrial Waste	Industrial and Municipal	Natural	Unknown
Alabama	2					2
Cahaba	2				1	1
Coosa	3					3
Escambia	1					1
Lower Tombigbee	1					1
Mobile	7			1	1	5
Tallapoosa	3					3
Tennessee	9	3	2			4
Warrior	2					2
Total	30	3	2	1	2	22

State of Arizona

Complete copies of the State of Arizona 305(b) Report can be obtained from the State agency listed below:

Bureau of Water Quality Control
Division of Environmental Health Services
Arizona Department of Health Services
1740 West Adams St.
Phoenix, AZ 85007

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B-09

Introduction

This report is prepared by the Bureau of Water Quality Control (BWQC), Arizona Department of Health Services, for submission to Region IX, Environmental Protection Agency (EPA) in fulfillment of the requirements set forth in Section 305(b) of Public Law 92-500.

The format of this report follows the suggested guideline for the FY 78 report when the Section 305(b) requirement may be merged with other reporting requirements.

The document describes the status of the waters of Arizona during the calendar year 1976. Information relating to periods prior to this time has been reported in previous reports. Future reports will cover times subsequent to December 1976.

The report lists the stream segments, by basin with the designated use assignments, and hence the water quality standards applicable to each stream segment. The monitoring activities on the various stream segments are described and a tabulation shows all observed violations of the water quality standards. Some discussion is given relative to the violations and some present any future problems are identified.

In Sections IV and V of this report we discuss the 1983 goals and give our analyses of the administration of PL 92-500 by the EPA as it impacts Arizona and the attainment of the 1983 goals.

Section V—Analysis and Recommendations on Program

This section is written to communicate to the EPA certain practices in its administration of Public Law 92-500 that appear to be counter-productive to the fulfillment of the intent of the Act. These comments, based on observations of water quality-related problems in Arizona, should not be taken as complaints. Rather, they are given as constructive criticisms in the hope that where the criticism has foundation, and some remedy or consideration can be given the apparent problem, an improvement can be made which will have a beneficial effect on the quality of the waters of Arizona.

1. The data base available to the Bureau for a basis of use designation, standard assignment and for the determination of water quality, is deficient for many stream segments. This is partly a result of restrictions imposed on the Bureau by the EPA grant conditions and the direction of the program from a point not within Arizona. The national objectives may very well be appropriate on a broad national scale, but they may not be appropriate on a local level. We feel that the objectives of the Federal program within the State should reflect the needs as specified by the State. This could be accomplished by allowing the State to direct more of the monitoring effort to specific data needs.
2. The State monitoring program lacks continuity due to the changing emphasis of the national objectives. In the past four or so years, the emphasis has changed from intensive surveys to fixed station and now back to intensive surveys. A sampling program designed to gather data on trends or long-term changes should be maintained for a long enough period to complete the intent of the program. At the same time, there should be a capability to respond to the need to monitor a problem area on an appropriate time scale.
3. The nonpoint source permit system or control methodology appears to not be forthcoming from EPA. This has a strong negative impact on the quality of surface waters in Arizona. With the increased control of point source discharge of pollutants, the main major source of pollutants remaining is the nonpoint source category.

   Closely allied to the nonpoint source problem is the mining process of acid leaching where sulfuric acid is sprayed over an area which contains oxide ore of copper. The copper is leached out of the ore, the pregnant solution drains to a low point where it is collected, and the copper solution recovered for further processing. It is essentially impossible to collect and recover all the solution. In some cases, the solution finds its way into the groundwater, in other cases into the surface waters. In both cases, pollution of State waters occur from a definable source. Even though the source is definable, it appears that control of the serious source of pollution is not controllable via the NPDES permit system.
4. At this time, enforcement of the NPDES permit system lies within the EPA. It is apparent from the viewpoint of the State that adequate and timely enforcement of the permit conditions by the EPA does not exist. The most obvious lack of enforcement is related to the discharge monitoring report (DMR) requirement. If this requirement were fulfilled, and the obvious violations given prompt attention, the overall pollutant discharge from point sources could be reduced significantly.
5. The southern boundary of Arizona is common with Mexico. Some of the streams in Arizona enter the State from Mexico where water quality standards are not as well protected as they are in Arizona and as a result, significant pollutants enter the State from Mexico in these surface waters. The only apparent organization through which control of these pollutants can be achieved is the International Boundary and Water Commission. It is suggested that the EPA take a more active role in this process.
6. During some of the special studies conducted by BWQC and in the review of standards on Arizona streams, it is apparent that the criteria used to establish water quality standards for Arizona waters were largely established elsewhere in the nation. To some extent this is a valid procedure; however, it is a procedure that in some cases results in nonattainable standards in Arizona and standards that may be needlessly stringent. The EPA takes the stand that these standards are sacred and are not to be compromised. We suggest that in consider-

ation of many factors relevant to the waters of Arizona (hardness, turbidity, high pH, flood conditions) that may not be relevant to the water conditions from which standards criteria were developed, the EPA at least consider deviations from the "national" criteria where valid background data support standards different than the national criteria.

This same consideration should apply to the total impact of the water pollution control program. Local impacts, where well documented and substantiated, should be considered on that basis and not from criteria and decisions made on a national basis.

7. In looking forward to attaining the goals of PL 92-500, there are a few concepts that are ambiguous and at present not defined adequately for a working concept. One such concept or term is "navigable streams". The EPA has a definition of this term which is different than the U.S. Corps of Engineers and apparently different than Arizona's "Water of the State". Inasmuch as there is considerable interface between these three organizations, and the impact can be significant, a consolidation of needs based on these definitions should be made. Arizona feels the need to protect all surface waters, for which standards are set. This means in some cases that our definition include dry washes that could, in case of heavy rain runoff, contribute to a violation of a perennial stream and cause damage to a designated user of the stream.

Another concept that needs deviation or definition is stated in the goals of the Act in the language of "... discharge of pollutants into navigable waters be eliminated by 1985." What does the EPA consider "discharge of pollutants"? Is it the discharge of pollutants in an amount that would cause a violation of the surface water standards? A policy on this concept would be helpful in planning and implementing our pollution control program.

State of Arkansas

Complete copies of the State of Arkansas 305(b) Report can be obtained from the State agency listed below:

Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209

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B-13

Summary

The most significant conclusion from the analysis of current water quality is that substantially all of the waters located in the highly agriculturalized Mississippi Delta Region of Arkansas do not now meet the 1983 aquatic life and recreational water quality goals of the Federal Water Pollution Control Act Amendments of 1972. Further, due to the nature of the problems, it is considered unlikely that the goals will be met in these waters by 1983 or any time in the foreseeable future.

With the exception of the main stem of the White River, none of the major Arkansas Delta streams meet all of the water quality requirements for swimming and for propagation of desirable species of fish and aquatic life. In most cases, several of the appropriate parameters are substantially in violation of the minimum requirements. In particular, widespread violations of fecal coliform, dissolved oxygen and turbidity standards occur and significant concentrations of a variety of pesticides are found—including endrin, dieldrin, DDT and its metabolites and toxaphene.

In the remainder of the State's waters, 1983 water quality goals are now being met or, with a few notable exceptions, are expected to be met by 1983. A number of streams or segments outside the Delta are not now meeting the goals due to fecal coliform or dissolved oxygen problems related to point source discharges of inadequately treated municipal sewage. These problems are expected to be cleared up by 1983. Greatest improvements are still expected in the main stem of the Arkansas River, which has already shown substantial water quality gains in recent years. Current control programs by industries involving acid mine drainage should significantly improve long standing problems in a portion of the state's waters. Whether the streams involved will improve to the point of meeting the 1983 goal is not yet definite. Oil field brine problems are sporadic and widespread. Without a stringent control program, minimal improvements will be achieved.

In streams where industrial waste discharges occur, the improvements that have been, or will be, noted by implementation of the best practicable control technology (BPT) requirements of PL 92-500 are often quite significant, but incremental improvements expected by going from BPT to BAT (best available control technology) will often be obscured because of nonpoint source pollutant input to receiving waters.

We now have available the results of the National Eutrophication Survey. Out of the 16 Arkansas lakes studied in this project, 8 have been classed as eutrophic and 8 as mesotrophic. Also, algal assays were used to determine the limiting nutrient in each lake. The existing annual phosphorus loading is compared to the relationship proposed by Vollenweider (1975).

Regular water quality monitoring is presently performed on approximately 6,139 miles of the State's potentially fishable, swimmable streams. From a purely water quality standpoint, all of these streams would be suitable for the above uses in the absence of man's influence. However, considering the present effects of man's influences on the quality of these waters, it is projected that 4,537 miles or 74 percent will meet the 1983 goals of PL 92-500. This leaves 1,602 miles or 26 percent that will not meet the goals, generally, because of nonpoint source pollution.

In 1976, an updated sewerage works "needs" survey for Arkansas was completed. The total projected expenditure needed for the correction of all categories of sewage problems was calculated to be $633,917,000.

There are 349 Arkansas towns—without any type of sewer system—which represent a population of 77,065. Approximately 33 of these communities either have plans completed or construction projects underway for new sewage collection and treatment systems.

Very little data have been collected as yet on the type of treatment needed and costs necessary to meet BPT and BAT requirements for industrial dischargers in 1977 and 1983, respectively.

There are three major groups of industries in Arkansas that are significant both for the number of people employed and for their polluting potential. These include the food products industry, the forestry-related products industry, the chemical products industry, and the petroleum refining industry. Rough treatment costs estimates were made on various segments of these industries; however, these at best provide only vague indications of total cost.

The EPA has made recent proposals relative to permit requirements for point source discharges from concentrated feedlots, silvicultural activities and agricultural operations—including irrigation return flows. As yet, we have no information on control costs for these point sources. It might be noted, however, that the establishment of permit requirements for agricultural discharges, such as irrigation return flows and fish farming operations, will have considerable impact in terms of administrative costs alone in a highly agriculturalized state such as Arkansas with concomitant benefits being rather unlikely.

Information on nonpoint source control cost is totally lacking. The implementation of Section 208 planning should produce such information.

An assessment of social and economic benefits resulting from pollution control programs must first consider the many aspects of recreation found in and on the waters of the State. There are approximately 10,000 miles of fishable streams and 600,000 acres of manmade and natural lakes in Arkansas. During 1976, 504,298 resident fishing licenses were sold in the State. Also in 1976, 91,005 trout stamps were issued. The State ranked 7th nationally by selling 243,275 nonresident fishing licenses.

There are 32 state parks in Arkansas, most of which feature water-based recreational facilities. Visitors numbered 3,919,083 in these parks in 1976. There are an estimated 300,000 boats on Arkansas' waters, with boating activities including fishing, sailing, waterskiing and canoeing. During 1976, over 31.8 million people visited the 25 U.S. Corps of Engineers projects in the State. It is obvious that water-based recreation provides vast economic and social benefits to the people of Arkansas and that preventing and controlling water pollution is a significant factor in preserving and enhancing these benefits.

Evaluating nonpoint source water pollution in Arkansas and developing control programs for the various categories of such pollution is now underway following the areawide wastewater management planning provisions of Section 208 of PL 92-500.

As has been mentioned, agricultural nonpoint source pollution is the most significant category in Arkansas. The erosion control programs of the U.S. Soil Conservation Service, if completely implemented, would result in considerable improvement in the quality of runoff from agricultural watersheds, but it is questionable if this program alone would allow water quality goals to be met. This would, however, be an important step and the solution of the financial problems that have retarded implementation of this program would be welcome.

The severity of nonpoint source pollution from widespread silvicultural activities in Arkansas is an area of considerable question and controversy. Representatives of all aspects of forestry interests as well as the general public have considered the problem and recommended specific steps to define and control the problems that are found to exist. The formation of a research task force for this and other areas of nonpoint source pollution is being considered as a part of the Section 208 planning program.

Information on nonpoint source pollution related to construction activities and urban runoff will be forthcoming following the completion of Section 208 studies planned, or in progress, for the areas designated as having substantial water quality control problems as a result of urban-industrial concentrations, or other factors. These designated areas are Texarkana-Miller County, Little Rock-North Little Rock, Fort Smith and Pine Bluff.

Additionally, Statewide Section 208 studies are beginning for the nondesignated areas of the State. The Arkansas Department of Pollution Control and Ecology is the designated agency for performing these studies.

State of Connecticut

Complete Copies of the State of Connecticut 305(b) Report can be obtained from the State agency listed below:

Division of Water Compliance and Hazardous Substances
Department of Environmental Protection
165 Capitol Avenue
Hartford, CT 06115

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Summary

Water Quality Monitoring

The State of Connecticut presently operates two types of monitoring programs. These two programs are dissimilar in nature because they have been established for different purposes.

The first program is the short-term intensive water quality program which generates a large volume of water quality data during a relatively short period of time (several days). The purpose of these data is to provide a "complete description" of water quality in a critical stream segment during critical conditions (low flow and high temperature). The value of this program is that with the data generated by this monitoring program, mathematical representations of water quality reactions can be used to predict treatment levels which will result in achieving or maintaining water quality standards.

The second program is the long-term or trend monitoring program. This program monitors water quality over a long period so that water quality trends may be discerned. The value of this program is that documentation of water quality changes provides the basis of evaluating the effectiveness of water pollution control programs, and indicates a need to redirect or expand current water pollution control efforts.

Long-Term Trend Monitoring

A long-term trend monitoring network or primary monitoring network was established in 1967. This network consisted of 96 stations throughout the State. Sample collection and analysis were accomplished during the spring, summer, and fall for a total of three samples per station per year. Parameteric coverage consisted of physical, chemical, and bacteriological parameters. This network was replaced by a new monitoring network which was initiated in July, 1973.

The monitoring network started in July of 1973 consisted of 42 stations throughout the state. Samples were collected monthly and were analyzed for physical chemical and bacteriological parameters. Additionally, sediment samples were analyzed once a year.

It was expected that this minimum program could eventually be increased to 90 stations as additional funding became available. Unfortunately, due to severe budget restraints, the program was cut back again in August, 1976. These changes provide for monthly sampling at 35 stations and quarterly sampling at three stations. Two stations were eliminated from the program. An added benefit was gained, however, in that the U.S. Geological Survey agreed to supply data on instream loadings of various parameters as well as concentrations.

Linear Regression Analysis

In March, 1977, the data gathered by the State's long-term trend monitoring network were used to make an analysis which would discern any statistically valid trends over the period of record. The linear regression analysis uses a time-dependent variable (along with other variables such as flow and temperature), to identify trends in the data.

The findings of this study overwhelmingly indicate that water quality in the State of Connecticut is improving. Of the 92 tests performed, 67 or 73 percent show signs of improvement. Of these 35, 40 percent show improvement at the 90 percent level of confidence; and 35 tests show that the rate of improvement is significant.

Also of importance is the finding that of 92 tests performed only 5 percent show signs of degradation.

As the data base improves and expands in terms of the number of measurements, it is expected that the data will show stronger trends. Most of these trends are already in the direction of improvement. As more measurements are available the trend of improvement should be strengthened.

Most of the improvement which this study reveals is due to the control of point source pollution through the application of best practicable wastewater treatment technology. As the State Water Pollution Control Program progresses to application of advanced waste treatment systems and, as necessary, control of nonpoint source pollution, additional improvements in water quality can be expected.

Basin Planning—Section 303(e)

The draft Phase I basin plans were submitted to EPA in June 1976. These plans included loading allocations for wastes quality limited segments where feasible. Load allocations for more complex systems, or systems with incomplete data bases are still being analyzed. Much of the remaining analysis will be incorporated into the Phase II basin plans now under preparation as indicated in the annual state strategy for water pollution control.

It should be noted that if the November 1978 court stipulated deadline for submission of Phase II plans is not extended, the Phase II plans will become shallow documents perpared to meet the requirements and not a comprehensive planning tool as originally designed.

Areawide Waste Treatment Management Planning—Section 208

In 1976, the EPA awarded Connecticut a $1,000,000 grant to conduct Section 208 planning on a statewide basis. This program as conceived in the Section 208 application consists of studies dealing with land use/ water quality, lake eutrophication, groundwater contamination, erosion and sedimentation, agricultural runoff, and disposal of sludges from wastewater treatment facilities. The Project Control Plan which established the study structures and goals of the $1,000,000 Section 208 program will be submitted to EPA in March 1977.

It should be noted that a statewide Section 208 program cannot be completed with the present level of funding. Latest estimates indicate that an additional $4,000,000 is necessary to conduct a complete and comprehensive Section 208 program in Connecticut.

The Statewide 208 Board has sued the EPA for failure to provide sufficient funds for the Connecticut program because of the impoundment of the 137 million dollars of Section 208 monies. Connecticut and the EPA have signed a stipulated agreement which will provide the statewide board with an additional 3.5 million dollars if the impounded funds are released. Even if the additional monies are approved, it is extremely doubtful that a Section 208 plan can be completed by November 1978.

Facilities Planning—Section 201

The general cost breakdown for Section 201 construction grants is given in Figure 3-1 of the report. Specific grants by municipality are given in Appendix E of the report, the Construction Grants List. Advanced waste treatment grant allocations reflect load allocation analysis from complete Section 303(e) plans.

NPDES Permit Program—Section 402

In 1976, 39 NPDES Permits were issued. This brings the total issued since 1975 to 628. Following the removal of chlorination as an intergal part of "secondary treatment" the State plans to modify extending NPDES permits to require chlorination as necessary to meet water quality. Year-round chlorination of effluents discharged to small receiving streams will be required, but seasonal chlorination between May 1 and October 1 of each year will be allowed for effluent discharges to major streams. This policy will take effect on October 1, 1977.

Past Activities

Connecticut began a statewide program of comprehensive water pollution control in 1925 when it established the State Water Commission. This commission established a pollution abatement program in conjunction with the State Department of Health. In 1957, the State Legislature superceeded this commission with the Water Resources Commission. Connecticut drafted the Clean Water Act in 1967. This act called for the restoration of water quality consistent with the uses and wishes of the States's citizens. The subsequent water quality standards prepared by the State in 1967, were approved in total by the Federal Government in 1970. These stream classifications were revised in 1973 by the State to reflect water quality improvements. The Water Resources Commission acted as the State Water Pollution Control Agency until the present Department of Environmental Protection (DEP) was established by the General Assembly in 1971.

The State's water quality goals, prior to 1972, did not require a minimum standard of "B" for every stream in Connecticut. The new goals, in part a result of the 1972 Amendments, will have effects on future growth and development patterns, due to the cost of attaining and maintaining these goals. State programs for clean water have attempted to address water quality problems which result from many sources including septic system failures, the discharge of inadequately treated domestic sewage and industrial wastes, periodic raw sewage discharge resulting from combined storm and sanitary sewer systems, and the effect of groundwater and surface water inflow and infiltration to sewers as well as those of urban runoff and other sources. Much of the momentum gained under Connecticut's Clean Water Program initiated in 1967 was reduced when the State could no longer pre-finance water pollution control projects. The momentum was further reduced due to several procedural requirements of PL 92-500.

Progress

In 1976, the DEP's Water Compliance Unit conducted a survey to determine the progress made in upgrading water quality. The survey found that since 1967, 165 stream miles or 25 percent of all State streams requiring upgrading have been improved to comply with the 1983 water quality goals. These improvements are mainly attributable to the success of the State's program in expanding and upgrading treatment plants to secondary treatment providing extensions of sewer service where needed, eliminating or providing appropriate treatment of industrial waste discharges, and eliminating a number of raw sewage discharges caused by sewer system infiltration and combined storm and sanitary sewer systems.

A summary of the water quality inventory (Table 2-1 of the report) indicates that all basins suffer from nonpoint source pollution in varying degrees. Large river basins with water quality limited segments like the Connecticut River Basin are hampered in improvement efforts because of combined sewer and nonpoint source problems. The Draft Phase I Section 303 (e) basin plans have developed strategies for meeting future water quality needs. The progress of improving water quality will depend largely on the levels of Federal construction funding realized for this purpose, especially with respect to allocations for combined sewerage facility correction which are presently non-existant, and where administration requirements limit the ability to realize project goals with the available funds.

State of Delaware

Complete copies of the State of Delaware 305(b) Report can be obtained from the State agency listed below:

Division of Environmental Control
Department of Natural Resources and Environmental Control
Tatnall Building, Capitol Complex
Dover, DE 19901

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Executive Summary

Delaware's streams are generally in very good condition. As reported last year, ten stream segments are already meeting the 1983 goals of the Federal Water Pollution Control Amendments of 1972. All streams should be able to meet these goals by 1983.

Most of Delaware's streams support the propagation and maintenance of fish and wildlife. The major area where this is not the case is the Delaware River from the State Line to the vicinity of the Chesapeake and Delaware Canal where pollution prevents some, though not all, species from flourishing. Improvements in this section of the river remain dependent upon the upgrading of major industrial and municipal treatment facilities upstream in the States of Pennsylvania and New Jersey.

The elimination and/or control of point sources in the stream basins have highlighted the significance of nonpoint sources which include man-made pollution from urban and industrial areas, and natural pollution from wildlife and waterfowl. During the remainder of this decade, Delaware will concentrate on quantifying the effect of the nonpoint source problems and implement control strategies. Completion of areawide waste management plans will assist the State in this effort. Table 1 summarizes Delaware's water quality.

The Environmental Protection Agency (EPA) has delegated to the Department of Natural Resources and Environmental Control (DNREC) the authority to issue National Pollutant Discharge Elimination System (NPDES) permits. These permits establish a timetable for meeting State and Federal requirements of best practicable control technology by July 1, 1977. Permit requirements have also eliminated a number of minor discharges which are presently connected to wastewater collection and treatment systems or converted to another type of discharge, that is, spray irrigation.

Delaware's Water Quality Management Program is a continuing program. It recognizes that issuance of permits alone does not mean achievement of all standards. It takes years for plans and programs to be fully implemented, and additional time for stream segments to recover. In some estuaries it may not be possible to meet shellfish and swimming criteria for total and fecal coliform bacteria because of the substantial migratory bird population.

The State has a continuing concern with ground water quality degradation and is taking forceful action to prevent it. The experience with landfills that have resulted in aquifer contamination has led to the establishment of strict, new standards for such disposal methods. Accordingly, both their location and their construction are care-

TABLE 1
1976 SEGMENT EVALUATION

Segment description	Segment number	Classification WQL/EL	State priority	Evaluation of water quality
Naaman's Creek	1	EL	15	III
Brandywine Creek	2	EL	12	I
White Clay Creek	3	EL	7	II
Upper Christina	4	WQL	1	II
Lower Christina	4	EL	1	III
Red Lion Creek	5	WQL	10	II
Chesapeake & Delaware Canal	6	WQL	9	I
Blackbird-Appoquinimink	7	EL	4	II
Chesapeake Drainage System	8	EL	19	I
Smyrna River	9	EL	11	II
Leipsic River	10	EL	14	II
St. John's River	11	EL	6	II
Choptank River	12	EL	20	I
Murderkill River	13	EL	13	II
Mispillion River	14	EL	16	II
Cedar Creek	15	EL	17	II
Broadkill River	16	WQL	8	III
Nanticoke River	17	WQL	3	I
Indian River	18	WQL	2	I
Little Assawoman	19	EL	5	II
Buntings Branch	20	EL	18	III
Delaware River—River Mile 78.8 to River Mile 59.5				III
59.5 to River Mile 48.2				II
Delaware Bay				I
Atlantic Ocean				I

NOTE: A detailed assessment of each segment is provided in the text of this report.

KEY:

I —Waters of good to excellent water quality which basically meets all water quality criteria with only minor, infrequent violations of water quality standards.

II —Waters of fair to good water quality which periodically have some problems in one or more water quality criteria.

III—Waters in which there is a perennial problem in meeting one or more water quality criteria. Most of these are tidal waters impacted by the natural process of the estuarine system.

fully regulated.

The expanding population of Delaware has also increased the demand for septic tank use and this, too, is being carefully scrutinized and regulated.

Delaware also faces eutrophication problems in most of its lakes and ponds. The Department has cooperated with the EPA in the National Eutrophication Survey of Selected Ponds in the State of Delaware.

Another problem enumerated last year is the encroachment of urban development along the shores of the inland bays. The growth rate of such development has been slowed because of economic conditions, but the potential exists for accelerated growth with the improvement of the economy.

Cost estimates for wastewater treatment facilities continue to be high. Many water and related land use activities will, it is hoped, reduce the total costs through non-structure control programs.

In order to provide a uniform basis for various planning activities, a special consortium of planners representing all interested parties was created to study population projection procedures. This effort has resulted in a new population forecast for the coming decade which will be used by all agencies.

This summarizes Delaware's problems and its plans to cope with them as we move to make all of our water quality compatible with the goals established by Congress.

District of Columbia

Complete copies of the District of Columbia 305(b) Report can be obtained from the State Agency listed below:

Department of Environmental Services
Water Resources Management Administration
415-12th St. NW Room 307
Washington, D.C. 20004

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Current Water Quality And Recent Trends

Potomac and Anacostia Rivers

Both the Potomac and Anacostia Rivers are tidal within the D.C. area, although the average difference between high and low tide during the summer is only 2.5 feet. However, the water is fresh, that is, less than 0.5 parts per thousand (0.5 ppt or 5,000 mg/l) total salinity. Periodically, according to the very limited sampling which is discussed in the report in more detail, the so-called "fishable, swimmable" water quality standards were violated in the three existing Potomac River segments and also the single Anacostia River segments within D.C. (If the proposed revisions of the water quality standards are approved, the Potomac River segments will be reduced from the existing three to two.)

However, if fishing itself can be considered biological monitoring, the Potomac River within the D.C. area has become "fishable" even for largemouth bass, which normally thrive only in water of reasonably good quality. The twelve members of the Potomac Bassmasters of Virginia held their first Potomac bass fishing tournament in November 1976. During this tournament 33 pounds of largemouth bass were caught.

Small Tributaries of The Potomac and Anacostia Rivers (D.C. Area)

Rock Creek, Single Branch, Kimble Branch, Hickey Run, Watts Branch, Brackma Branch and Oxon Run are small streams in the densely developed D.C. urban area. These streams are affected by all of the contaminants in urban storm runoff as well as the sewage portion of overflows from the combined sewer system. During and immediately after storms, they tend to be turbid, particularly Rock Creek and Oxon Run, with silt from erosion of soils, some of which comes from upstream in the Maryland suburbs. Rock Creek and Oxon Run are both classified for fish and wildlife propagation, and Rock Creek is designated for wading as a future use. The water quality monitoring program for these streams is insufficient to generalize, but during and after storms they probably do not meet so-called "fishable-swimmable" water quality standards.

State of Florida

Complete copies of the State of Florida 305(b) Report can be obtained from the State Agency listed below:

Department of Pollution Control
2562 Executive Center Circle
Tallahassee, FL 32301

B-27

Summary

The water resources of Florida are among the most unique, valuable, and widespread of any State in the nation. The shoreline of Florida fronts on the Gulf of Mexico and the Atlantic Ocean. Including salt-water rivers, islands, bays, and sounds, the shoreline extends for nearly 11,000 linear miles. Inland waters include 1,711 named streams ranging in length from 0.4 miles to 818 miles. There are 7,712 named and unnamed lakes ranging in size from one acre to almost one-half million acres. The only living coral reef in the continental United States forms the eastern barrier of the Florida Keys.

The wildlife resources of Florida waters are numerous and diverse. Commercially valuable fisheries harvest shellfish and finfish. Water sports, including sport fishing, in conjunction with the mild climate, act as attractions to the millions of tourists who visit Florida annually.

Freshwater streams are being considered as potential sources of potable water for the rapidly growing metropolitan areas of southern Florida, and these streams are being proposed for impoundment and industrial development. Maintaining the quality of its waters must be a high priority of the State, since the economy of Florida, more than that of most other states, relies on activities which depend upon the aesthetics and the natural resources associated with plentiful supplies of clean, high quality water.

Even though clean waters are an economic asset of considerable value to the people of Florida, considerable stresses have been placed on the aquatic systems of Florida by industrial development and by the rapid, recent population increase. (Florida's population has increased by the greatest absolute number of any State in the past few years, and it has been projected to grow substantially by 1985). Florida waters are polluted from several sources. Industrial polluters include agricultural processors, chemical plants, paper mills, and electrical power plants. Domestic wastes from households and wastes from smaller commercial operations are discharged to the waters of the State by sewage treatment plants, ocean outfalls, and septic tank drainage. Pollutants not attributable to specific sources include storm runoff from urban areas; drainage from farms, forests, and mines; intrusion of saltwater into depleted freshwater aquifers; and discharges from ports and marinas. Another major source of pollution in Florida is dredge and fill activities involving the destruction of submerged lands and wetlands, disposal of dredged spoil, and shoreline alteration.

This latter source of pollution is a particular problem in Florida. Large numbers of people from other parts of the country are retiring here or building vacation houses. This influx of people has contributed to large demands for water-front property. This has been met by land developments in which canals have been filled, and canal-front lots constructed. These land use practices have stressed the aquatic ecosystem by eliminating natural drainage and allowing poor water quality conditions to develop, by removing productive wetlands from the ecosystem, by reducing the habitat available for larval fish and shellfish, and by reducing the capacity of the wetlands to filter pollutants from runoff. These problems, taken together, make uncontrolled proliferation of canal systems and shoreline alteration a serious long-term Florida water quality problem. In the long term, these activities may have the potential to damage or to destroy many of the aesthetics and natural resources which originally attracted retirees and vacationers to Florida.

More immediate water quality problems are related to cultural eutrophication, the human aided and abetted increase in the rate of aging of a body of water. Data presented in this report show that the levels of nutrients (nitrogen and phosphorus) in almost every basin segment in Florida are higher than the accepted norms. Secondary water quality problems demonstrated by data in this report include low levels of dissolved oxygen and high populations of coliform bacteria. More rarely, high levels of phytoplankton are found.

The State of Florida has responded to the problem of water pollution by adopting and implementing a number of environmental protection statutes (for example, Chapters 253, 373, and 403, F.S.). In Florida, the Department of Environmental Regulation is the administering agency for programs under the Federal Water Pollution Control Act of 1972 (PL 92-500). The goals of the Federal and State programs are to manage discharge of domestic and industrial waste, to control nonpoint source pollution, and to regulate alteration of bottoms and shorelines of State waters. The State has also adopted minimun conditions for the quality of its waters and has established a water quality classification based on the uses of water bodies.

Point discharges of domestic and industrial wastes are permitted under State and Federal (NPDES) programs. Nonpoint source pollution will be managed by the State and by the areawide Section 208 programs and by management practices to reduce pollutants in runoff. The State has a well-developed permitting system to require permits for construction projects affecting submerged lands and wetlands. Such projects are evaluated for immediate and long-term impacts on the aquatic ecosystem. These programs are discussed in more detail in Chapters II and III of this report.

In 1976, ten bodies of water in the State did not consistently meet the Class III water use criteria (safe for recreation and fish and wildlife). Six of these waters are expected to be consistently within these criteria by 1985. Maintaining and enhancing water quality in the waters of the State will require more advanced treatment of domestic wastes, control of nonpoint sources of pollution, and greater protection of wetlands. These programs are necessary to maintain the quality of the Florida environment, and they will become even more urgent if the population increases as rapidly as has been projected.

State of Georgia

Complete copies of the State of Georgia 305(b) Report can be obtained from the State agency listed below:

Environmental Protection Division
Department of Natural Resources
270 Washington St., S.W.
Atlanta, GA 30334

Summary

Monitoring Trends in Georgia's Waters

In order to monitor trends in water quality in Georgia's streams, reservoirs and coastal waters, the State maintains 120 water quality monitoring stations. These are located on major water bodies at sites which reflect much of the human impact on the State's waterways. Information from intensive surveys, special studies and operating reports from wastewater treatment facilities is used along with data from the trend stations to provide an adequate reflection of the quality of the State's waters.

Several lengths of streams improved in water quality during 1976. The Cattahoochee River downstream from Atlanta continued to improve as a result of upgrading of treatment at the R. M. Clayton wastewater treatment facility. Similar improvements occurred in the Chattahoochee River downstream from the City of Columbus. Water quality also continued to improve in the Conasauga River downstream from the City of Dalton, a highly industrialized area.

No worsening of water quality was documented at any of the trend monitoring sampling sites during 1976.

Water Quality Standards

During 1976, Georgia conducted a review of its water quality standards. As a result, twenty-six of the thirty-seven stream segments having a classification lower than fishing were reclassified to fishing. Seven additional stream segments had their classification upgraded to fishing with specific conditions of exception.

Most of Georgia's waters met applicable water quality criteria during 1976. Most violations were related to municipal or industrial wastewater discharges or urban runoff; the most significant violations were in the Atlanta vicinity. Fecal coliform bacterial density continued to be the most violated criterion. As new wastewater treatment facilities are constructed and operation and maintenance improves there should be a reduction in water quality violations.

Water Quality Management

During 1976, the requirements of PL 92-500 Sections 303(e), (continuing planning) and 208 (area-wide planning) were combined. Thus, the State's continuing planning and areawide wastewater treatment management planning.

In June, EPA approved Section 208 grant applications for the State and three designated areawide agencies totaling $2,313,250. These grants provide 75 percent Federal funding.

In 1976, Georgia developed a detailed work plan for Statewide water quality management. The work plan relies heavily on the fifteen first edition river basin plans completed in 1975. Phase 2 water quality management plans will include areawide wastewater treatment management with four areawide management plans, State water quality management strategy, second edition river basin management plans, and nonpoint pollution control best management practices.

The Environmental Protection Division continued its participation as one of four voting members of the Atlanta Water Resources Study. During 1976, a wastewater treatment management plan was completed and adopted by the Atlanta Regional Commission (ARC) and concurred with by the State.

Other water quality management projects conducted in 1976 included a low-flow requirements study for the Coosa River at Rome, the City of Savannah water resources study (conducted by the U.S. Army Corps of Engineers), and areawide wastewater treatment management planning in the Chattanooga area.

Facility Status

At the present time in Georgia, 124 of 132 "major" industrial facilities are considered to be capable of providing best practicable control technology currently available (BPT). Of the 413 "minor" discharges, over half are providing BPT treatment. Many of the remaining minor discharges are non-contact cooling water and boiler blowdowns. During 1976, many industrial dischargers were in the process of major construction projects to upgrade their systems. These projects included expansions of activated sludge systems, complete recycle systems, installation of filter systems, and land application systems.

Over 99 percent of the municipal wastewaters in Georgia are now receiving some form of secondary biological treatment. In many cases, however, this is still insufficient to meet water quality standards in receiving streams. In those cases, treatment facilities must be upgraded. In 1976, 41 facilities had construction projects completed which have a total design flow of almost 42 million gallons per day. In addition, seventeen inadequately treated discharges were eliminated and the flow diverted to adequate treatment facilities. As more facilities are upgraded there will be more emphasis on facility operation and adequate industrial pretreatment.

Permits

The State of Georgia has had the authority to administer the National Pollutant Discharge Elimination System in Georgia since June 1974. Since that time, 737 NPDES permits have been issued: 284 to municipal dischargers, 347 to industrial dischargers, and 106 to private and institutional dischargers. During 1976, 14 municipal, 121 industrial and 1 private and institutional NPDES permits were issued. The problem of issuing five-year permits to municipalities which cannot meet the July 1, 1977, effluent deadlines specified in PL 92-500 is primarily responsible for the small number of municipal permits issued in 1976. Approximately 6 percent of the total wastewater volume in Georgia remains to be permitted.

Compliance, Operation and Maintenance, Enforcement

To maintain compliance with applicable State laws, regulations, and permit conditions, the Environmental Protection Division (EPD) employs several methods. These include review of self-monitoring data, facility inspections, effluent sampling, complaint investigations, technical assistance, and enforcement actions. Compliance sampling inspections were made at many facilities during the year and the results compared with permit requirements. The EPD attempts to sample every major discharge at least once a year. In addition comprehensive operation and maintenance (O & M) inspections were completed at 120 municipal facilities.

All major industrial discharges were inspected. The O & M inspections at municipal facilities have shown the major problems to be: Significant infiltration and inflow to sewer systems; inadequate manpower and training of operators; little or no pre-treatment of industrial wastes; and, inadequate budgets to operate and maintain the systems.

As a result of the sampling and operation and maintenance inspections, eight administrative and consent orders or fines were issued to enforce water quality requirements in 1976.

Abatement Costs

Funds for constructing municipal systems in Georgia come from several sources. In 1976, approximately 62.5 percent was received through the Environmental Protection Agency's construction grants program. Local governments provided 20.6 percent, and the remainder came from the Department of Housing and Urban Development, the Farmers Home Administration, the Appalachian Regional Commission, and State grants. In 1976, another municipal Needs Survey was completed which estimated $1.29 billion for construction of sewers, force mains, pumping stations and wastewater treatment plants. An additional need of $342 million was estimated to correct infiltration and inflow problems, construct new collector sewers, and to correct problems from combined sewer overflows. In 1976, approximately $136 million was spent for wastewater projects. Most of this money—77 percent—was spent in Georgia's urban areas and the rest went to smaller communities; however, more grants were awarded to smaller municipalities.

The operational costs for municipal facilities are very significant. These costs are rising rapidly, especially for energy requirements.

Since Federal funds are not involved, costs estimates for construction and improvements in industrial systems are not as reliable as those for municipal facilities. However, to meet the 1977 Federal effluent guidelines, it is estimated that $50 million in capital expenditure would be necessary to install or upgrade industrial systems. The expenditure which will be required to meet the 1983 Federal effluent guidelines is very uncertain. Since promulgation of best available technology economically achievable (BAT) effluent limitations have had a constantly fluctuating status, little detailed planning has been done. The best estimate of these costs is about $200-250 million.

The accomplishment of the national water quality goal for 1983, to have all waters meet "fishable" or "swimmable" water quality, is uncertain at this time in Georgia. Hundreds of streams are subject to urban runoff; water quality data exist on only a few of them. In addition, there are many industries and municipalities that are discharging to small streams where very high degrees of treatment would be required. Although facilities planning is in progress at this time, it may not be financially or administratively possible for all the municipalities to implement the necessary programs. If Federal grant allocations to Georgia of about $100 million per year are made for the next five years, nearly every stream receiving discharges could probably meet fishing standards by 1983.

Nonpoint Source Pollution

Nonpoint source pollution control in Georgia is being carefully studied and evaluated as a part of areawide (Section 208) planning. Seven categories of potential nonpoint source pollution have been identified for study. Task forces will be established to make an assessment of these sources and develop practices for controlling them. In 1976 the State Soil and Water Conservation Committee prepared a document entitled *Manual for Erosion and Sediment Control in Georgia.* Other agencies involved in nonpoint source pollution control are the Land Reclamation Section and the Groundwater Use Program of the Environmental Protection Division, and the Coastal Marshlands Protection Committee of the Department of Natural Resources.

Emergency Pollution

Approximately 156 oil and hazardous material spills were reported to the Environmental Protection Division in 1976, 40 percent of which were greater than 500 gallons. Most of the reported spills were of petroleum products which reached a waterway. Most spills did not occur during transportation of the spilled material.

A total of $9,500.00 was assessed and collected from persons responsible for hazardous material spills during 1976.

Operator Training

In order to improve operation and maintenance of water supply and wastewater treatment facilities and to assist operators in development and in passing State certification examinations, the State conducted sixteen courses at the water and wastewater institute, four short schools, and four on-the-job training courses. Total attendance was 511.

During 1976, the Georgia Water and Wastewater Technical School at the South Georgia Vocational Technical School at Americus was terminated and the Georgia Water and Wastewater Institute was established at West

Georgia College in Carrollton. One acre of land, adjacent to a Carrollton wastewater treatment facility, has been donated to the State by the City of Carrollton and will be the site of a new training center. This new facility, to be built with Federal Section 109(b) funds, will be designed during 1977 and construction will be completed in 1978.

Public Participation

During 1976, the State continued its contract with the Georgia Conservancy which included: Publication of the monthly newsletter entitled *Georgia Waterline;* conducting a one-day public seminar in Atlata to discuss the State water quality control program activities, the State program plan, and the State program goals, accomplishments, and objectives; and conducting a series of ten public meetings at various locations throughout the State to discuss the State program, State program plan and local problems with the public and local officials. Each of these activities was very successful and the contract was renewed for FY 1977.

Additional activities to encourage public participation included: The placement of draft copies of the FY 1977 Georgia Water Quality Control Program Plan in each of the Division's regional offices, in the Georgia Conservancy offices, and in four college libraries for public reference and review; a public hearing on FY 1976-FY 1977 Project Priority Funding list; a public hearing on the review of water quality standards and water use classifications; and, a public meeting to discuss the State Continuing Planning Process.

Guam

Complete copies of the Guam 305(b) Report can be obtained from the State agency listed below:

Guam Environmental Protection Agency
Box 2999
Agana, Guam 96910

Water Quality Assessment

Coastal Waters

Coastal waters surrounding Guam are often referred to as recreational waters where people enjoy swimming, fishing, diving, surfing, etc. These waters are of considerable value as long as they remain clean and useful, provide numerous benefits to the Island people, and attract many tourists. Another value of Guam's coastal waters (not apparently understood by many people) is that they serve as a nursery for the offspring of many species of marine life.

The Guam Environmental Protection Agency (GEPA) routinely collects samples from our coastal waters and analyzes them for fecal coliform bacteria. The presence of these organisms in high concentrations indicates that the sampled area has been polluted by the fecal discharge from warmblooded animals, including humans. As such, the area is to be considered unsafe for human contact. The GEPA designates the areas where the fecal coliform count is between 500 to 1,000 per 100 milliliters of the sample as "moderately polluted" areas. If the count exceeds 1,000 then the area will be termed as "heavily polluted." The "polluted" areas are published weekly in the PDN to guide people in recreational use of surface waters.

Table 1 shows the results of the bacterial examination of our coastal waters from March through December 1976. The 16 stations have an average frequency of pollution slightly less than 8 percent; 40 percent of this occurred in three days; March 31, May 12, and July 19. On these days, many areas showed moderate to heavy pollution. This is associated with heavy rainfall and the subsequent stormwater discharge into the coastal waters. In its journey towards the sea, the stormwater transports pollution from the watershed area, failing leaching fields and, to a certain extent, overflowing sewer lines. One station, Sleepy Lagoon, has a combined frequency of pollution of 21 percent resulting from the overflow of the sewer fringing the bay because of the inflow of the stormwater into the public sewer system. The other bad areas are Agat/Gaan Point, Santos Memorial Park, and the War Memorial Park, each of which had a combined frequency of 18 percent.

TABLE 1
BACTERIOLOGICAL EXAMINATION OF COASTAL WATERS
MARCH 1976—DECEMBER 1976

Station	Sample exam	Moderately polluted	Frequency	Heavily polluted	Frequency
Agana Boat Basin	17	—	—	—	—
Agat-Gaan Pt.	28	2	7%	3	11%
Inarajan Pool	45	—	—	1	2%
Ipan Public Beach	39	—	—	—	3%
M. Aflleje Memorial Park	40	—	—	1	3%
Marine Yacht Club	39	—	—	—	—
Marine Laboratory Intake	19	—	—	—	—
Merizo Boat Pier	44	1	2%	1	2%
NAS Storm Drain	43	1	2%	2	5%
New Agana Storm Drain	19	—	—	3	15%
Piti Park	39	3	8%	1	3%
Santos Merial Park	40	3	8%	1	10%
Sleepy Lagoon	43	3	9%	4	12%
Turtle Cove	15	—	—	5	—
War Memorial Park	40	2	5%	5	13%
Ypao Beach	42	—	—	—	—
Total	552	16		27	

Rivers and Estuaries

Guam's rivers and estuaries are highly productive aquatic environments that need to be protected from pollution. The estuaries serves as a nursery for a variety of marine life.

The GEPA's monitoring of these waters for pollution include analysis for fecal bacteria. Table 2 shows the results of the analysis conducted during the March through December 1976 period. The number and frequency of polluted samples was much greater than in our coastal waters. By far, the most seriously polluted area was the Pago River. There were two monitoring stations on the Pago River; one at the river mouth and the other at the outfall. The outfall station, adjacent to the Pago River Bridge, is the discharge point for the package sewage treatment plant constructed as an interim measure to treat sewage from the village of Yona. Due to poor plant design, equipment failure, and poor maintenance, the plant has been polluting the river ever since it became operational in 1974. Water samples taken near the outfall were found to be heavily polluted 88 percent of the time and moderately polluted for another 3 percent. As sewage moves downstream from its point of discharge, there is usually a decrease in the degree of pollution due to dilution and the natural die-off of organisms. We found the water quality at the mouth of the Pago River not much improved. It was still showing heavily polluted samples; those in excess of 1,000 colonies per 100 milliliters were found 65 percent of the time and moderately polluted another 8 percent.

The only other stations which showed an unusually high occurrence of pollution were the Asan River Mouth and the Umatac River Mouth. Fecal coliform levels exceed 1,000 colonies per 100 milliliters in 40 percent of the Asan River samples. This river showed moderate pollution during another 8 percent of the samples for a cumulative frequency of pollution of 48 percent. This degree of pollution was unexpected, since most of the village of Asan is served by public sewer. Apparently, a number of animal wastes and a number of faulty individual sewage disposal facilities exist along this watershed.

The sampling station at the mouth of the Umatac River was expected to show high counts. The village does not have a public sewer available and faulty individual sewage disposal systems are not uncommon in this area. Wastes from pigs and other animals also have an easy access to the river. The water discharging from this river into Umatac Bay was found to be heavily polluted in 35 percent of the samples and moderately polluted in 23 percent, indicating a cumulative frequency of pollution of 58 percent. The average combined frequency of pollution for the remainder of the rivers and estuaries is less than 17 percent.

TABLE 2
BACTERIOLOGICAL EXAMINATION OF RIVERS AND ESTUARIES
MARCH 1976—DECEMBER 1976

Station	Sample exam	Moderately polluted	Frequency	Heavily polluted	Frequency
Agana River Mouth	40	3	8%	6	15%
Asan River Mouth	40	3	8%	16	40%
Fonte River Mouth	40	5	13%	7	18%
Inarajan Bay	39	—	—	2	5%
Pago River Mouth	40	3	8%	26	65%
Pago River Outfall	40	3	3%	34	88%
Talofofo Surf Area	44	3	7%	4	9%
Umatac Bay	44	2	5%	2	5%
Umatac River Mouth	40	9	23%	15	35%
Ylig River Bridge	40	4	10%	3	8%
Total	407	33		115	

Metals Analysis

In November, the GEPA assisted a research team from Wakayama University in Tokyo. The team worked under a grant from the U.S. National Institute of Neurological and Communicable Disease and Stroke, as part of a Pacific-wide study of the possible correlation of high concentrations of manganese and nickel in drinking water and the occurrence of certain neurological disorders. Locally, Litigo and Bodig are of concern.

The research team, headed by Dr. Yoshiro Yase, obtained water samples from 39 streams, springs, wells and distribution systems.

The samples were analysed for amounts of twelve heavy metals, including lead, copper, iron, manganese and zinc. Calcium and magnesium hardness was also determined. Following initial analysis in the GEPA laboratory, the samples were taken to Japan for special analysis with sophisticated scientific instruments.

Tentative impressions of the group were:

- Well samples were very high in calcium and magnesium hardness due to the nature of the limestone northern plateau;
- Samples from springs and rivers in southern Guam had little calcium or magnesium hardness due to the volcanic nature of the rock; and,
- Manganese and nickel concentrations were generally high in all samples particularly from the Chalan Pago-Ordot-Mangilao wells.

Manganese and nickel are found in large amounts in the volcanic rock that makes up southern Guam and underlie the limestone of the northern plateau.

The authors have not yet published final results and conclusions.

State of Hawaii

Complete copies of the State of Hawaii 305(b) Report can be obtained from the State agency listed below:

Environmental Health Division
Department of Health
P.O. Box 3378
Honolulu, HI 96801

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The following information is abstracted from the State's previous 305(b) Report on water quality in the State of Hawaii. Because there are no changes from the last submittal, this report summarizes the problem of nonpoint source pollution considered as the major water quality concern in the State today.

The threat of nonpoint source pollution is identified throughout our coastal and inland areas. Soil erosion and runoff from agricultural activity; subdivision, land and highway development; shoreline alteration; construction; cesspool seepage; urbanization; and natural wind and water erosion are the major categories of nonpoint sources affecting water quality and the environment. The pollution problems and sources are widespread and vary with geographic location and land use. In spite of localized improvements for water quality parameters, achieved through control measures by municipal dischargers, problem areas affected by nonpoint source pollution are yet to show significant trends of improved water quality. The State Section 208 Planning Program is addressing these problems.

The parameters of water quality most often not meeting State standards are nutrients (nitrogen and phosphorus) and coliform bacteria. Although coliform violations in general appear less frequently than either nitrogen or phosphorus violations, they appear more widely distributed geographically and are frequently associated with inputs from fresh water sources (streams and rivers).

Intensive surveys are in progress to establish baseline concentrations of heavy metals and pesticides in water column and sediments from selected State basins. A brief summary of preliminary findings on heavy metals in nearshore marine sediments is discussed.

MEAN CONCENTRATIONS OF HEAVY METALS
FOUND IN NEARSHORE MARINE SEDIMENTS

	Mg/Kg Dry Weight							
State basin	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Kaneohe Bay	24.4	4.9	105	71	34	0.17	145	120
Kahana Bay	19	12.1	19.3	14.8	75.3	0.14	64.3	43.7
Hilo Bay	103.4	5.0	200	72.1	101.9	1.4	79.7	107.6
Hanapepe Bay	19.3	3.5	211.8	59.8	35.3	ND*	400	116.1
Ala Wai Canal	24.5	3.6	218.4	265.8	562	1.6	168.5	425.3
Honolulu Harbor	16.7	6.5	126.3	272.9	391.9	1.1	100.1	523.4

*Not detectable.

Analyses of sediments from the Ala Wai Canal show that mean concentrations of mercury are slightly lower last year than the previous year. The highest level is 5.1 ppm found near a boat dry dock and is lower by a two-fold margin from the previous year, also. Mercury concentrations were once believed to be as high as 85 ppm according to reports published in 1972. Sediments also show higher concentrations in lead at the Ala Wai Canal than at other sites in the State Basin. However, this level is found similar to that found in the previous year. Kaneohe Bay, where the only other basin for which data is available from a previous survey, shows no change from last year and are found comparable with background levels elsewhere.

Analysis for the first time on sediments from Hilo Bay shows that arsenic concentrations are exceptionally high. Although definite sources are not known, the use of herbicides and a former industrial processing plant are two possible contributing factors now under evaluation. Where concentrations of parameters are found notably higher in certain locations than in others, intensive surveys will be expanded to study the conditions more closely. Mean concentrations for other heavy metals in general fall within ranges found throughout the State Basins.

BASELINE SURVEY ON HEAVY METALS AND
TRACE ORGANICS FOUND IN WATER COLUMN AND
SEDIMENTS OF THE NEARSHORE MARINE ENVIRONMENT

State basin	Survey completion dates
Kahului Bay	8/10/76
Kaneohe Bay	8/24/76
Kahana Bay	9/ 7/76
Hilo Bay	9/22/76
Hanamaulu Bay	10/18/76
Hanapepe Bay	10/19/76
Ala Wai Canal and Yacht Harbor	11/ 9/76
Honolulu Harbor	11/30/76
Kaiaka Bay	*
Pearl Harbor	*

*Scheduled for 6/28-30/77.

INTENSIVE SURVEY COVERAGE OF BASELINE
PARAMETERS FOR STATE BASIN AREAS

Physical/chemical	Microbiological	Metals	Organics
Temperature	Total coliform	Arsenic	DDT
pH	Fecal coliform	Cadmium	DDE
Salinity	Fecal strep	Chromium	DDD
DO		Copper	Dieldrin
Turbidity		Lead	Lindane
TDS		Mercury	Chlordane
Kjeldahl nitrogen		Nickel	PCP
Nitrate-nitrite nitrogen		Zinc	PCB
Total nitrogen			
Total phosphorus			

Table 1 is a summary of water quality standards violations. Indicated in the summary are locations and their observed percentage violation of specific water quality parameters. Table 2 shows existing water quality from last year. The estimated values given are essentially similar with conditions this year and therefore presented for review only.

TABLE 1
SUMMARY OF WATER QUALITY VIOLATIONS

Percent violation range*	Location	Water quality parameter
85-100	Ala Wai Drainage Canal, Oahu	Nitrogen
(401)	Kaneohe Bay, Oahu	Nitrogen and phosphorus
	Keehi Lagoon, Oahu	Phosphorus
	Kaiaka Bay, Oahu	Nitrogen and phosphorus
	Kahului Harbor and Bay, Maui	Nitrogen and phosphorus
	Hilo Bay and Harbor Shoreline, Hawaii	Phosphorus
	Hanamaulu Beach, Kauai	Nitrogen and phosphorus
	Honaunau Bay Shoreline, Hawaii	Nitrogen and phosphorus
	Kailua Pier, Hawaii	Phosphorus
	Keauhou Bay Shoreline, Hawaii	Nitrogen and phosphorus
	Mahukona, Hawaii	Nitrogen
	Punaluu, Hawaii	Nitrogen and phosphorus
50-85 (838)	Kahana Bay Shoreline, Oahu	Nitrogen, phosphorus and coliform
	Ahua Pt., Oahu	Nitrogen and phosphorus
	Kaneohe Bay Shoreline, Oahu	Nitrogen and coliform
	Keehi Lagoon, Oahu	Nitrogen and coliform
	Ala Wai Drainage Canal, Oahu	Coliform
	Waikiki Beach, Oahu	Nitrogen
	Kahului Harbor and Bay, Maui	Coliform
	Kalaeloa Harbor, Molokai	Nitrogen
	Puhi Bay Shoreline, Hawaii	Nitrogen and phosphorus
	Milolii Shoreline, Hawaii	Coliform
	Kailua Pier, Hawaii	Coliform
	Honaupo, Hawaii	Coliform
	Honaunau Bay Shoreline, Hawaii	Coliform
10-50 (1,006)	Sand Island, Oahu	Coliform
	Honolulu Harbor, Oahu	Nitrogen, phosphorus and coliform
	Waikiki Beach, Oahu	Phosphorus
	Kewalo Basin, Oahu	Coliform
	Ala Moana Beach, Oahu	Phosphorus
	Kaiaka Bay, Oahu	Coliform
	Wailuku Breakwater, Maui	Coliform
	Kalaeloa Harbor, Molokai	Phosphorus
	Hilo Bay and Harbor Shoreline, Hawaii	Coliform
	Honolii Cove Shoreline, Hawaii	Coliform
	Kealakekua Bay Shoreline, Hawaii	Coliform
	Keauhou Bay Shoreline, Hawaii	Coliform
	Puako Beach Shoreline, Hawaii	Coliform

*Percentage figures are based on more than 2,200 analyses of samples obtained from the given locations since 1973. More than 13,000 analyses were performed on samples from throughout the State in the same period. The value in parenthesis indicates the total analysis of samples for each percent range.

Source: Department of Health, 1977.

TABLE 2
EXISTING WATER QUALITY

Water quality segment	Classification of water uses (a)	Estimated land use, %	Estimated total pollutant discharges on receiving waters, lb./day			Water quality data (b)				State water quality standards	
			BOD	Total nitrogen	Total phosphorus	Total-N, mg/l	Total-P, mg/l	Fecal coliform, MPN/100 ml	Total-N, mg/l	Total-P, mg/l	Fecal coliform, MPN/100 ml
Mamala Bay (70 sq. mi.)*	A, B	Agriculture <1 Open space 63	425	70	6	.160-.370	.015-.061	5-12,800	AA 0.10 A 0.15 B 0.20	AA 0.020 A 0.025 B 0.030	AA-essentially zero A 200 B 400
		Urban 36	124,000	14,000	2,200						
Pearl Harbor (132 sq. mi.)	AA, A, B	Ag. 35 Open space 38	1,300	210	20	.121-.288	.027-.247	5-430			
		Urban 12	45,000	3,800	985						
Kahului Bay (10.5 sq. mi.)	A, B	Ag. 29 Open space 65	250	40	4	.260-.470	.054-.385	26-6,800			
		Urban 6	9,000	600	150						
Kaneohe Bay (33.2 sq. mi.)	AA, B	Ag. 16 Open space 63	680	110	15	.010-.430	.026-.075	217-24,000			
		Urban 21	2,000	830	400						
Hilo Bay (261 sq. mi.)	A, B	Ag. 10 Open space 85	4,380	700	64	.020-.340	.018-.057	3-460			
		Urban 5	30,000	No data	No data						
Port Allen (27.2 sq. mi.)	B	Ag. 34 Open space 65	1,000	160	15	.020-.140	.008-.028	2-170			
		Urban <1	200	340	12						
Hanamaulu Bay (8.5 sq. mi.)	A	Ag. 51 Open space 47	138	22	2	.300-.470	.046-.064	2-1,300			
		Urban 2	Insignificant amount								
Kaiaka Bay (76 sq. mi.)	A	Ag. 33 Open space 64	288	46	4	.320-.680	.024-.321	2-930			
		Urban 3	1,500	1,300	350						
Kahana Bay (8.4 sq. mi.)	AA	Ag. 2 Open space 97	370	60	6	.120-.460	.019-.050	23-1,300			
		Urban <1	Insignificant amount								
S. Molokai (131 sq. mi.)	AA, A, B	Ag. 10 Open space 89	440	70	6	.170-.280	.005-.027	2-790			
		Urban <1	Insignificant amount								

*Numbers in parenthesis are land areas in segments.

(a) Underlined is predominant class.

(b) Data from Water Quality Monitoring Data, Department of Health, State of Hawaii, 1974-75 ranges

(c) Data from U.S. Navy's Pearl Harbor stations RW 39, 41, 23, and 71.

State of Idaho

Complete copies of the State of Idaho 305(b) Report can be obtained from the State agency listed below:

Department of Health and Welfare
Statehouse
Boise, ID 83720

B-41

Summary

This report updates the Water Year 1975 Water Quality Status Report.

Water quality data presented indicate that significant reductions in municipal and industrial point source pollutant loads over the past few years have had a measurable effect in some streams. It is also apparent that nonpoint source pollutant loadings have a major impact on stream water quality so that water quality standards and goals may not be achieved for many streams until such sources are considerably reduced.

Considerable progress has been made in developing a nonpoint source pollution control program, which is expected to benefit substantially from the Statewide Section 208 program. Eight major categories of nonpoint source pollution are described along with methods of control and abatement. The extent of nonpoint source pollution is not expected to decrease without application of best management practices. Numerous agencies have varying degrees of authority to control pollution from nonpoint sources. With some refinement, these authorities can become the means to apply best management practices.

The State of Idaho has completed the first effort of planning related to PL 92-500 by completing Section 303(e) planning for the State's six hydrologic basins. Now, with fiscal assistance from the EPA, the State has begun a new phase of planning required by Section 208 of PL 92-500. This planning will compliment previous work by taking developing plans to the point of implementation. Section 208 planning will give special consideration to the reduction of water pollution from nonpoint or diffuse sources.

State of Indiana

Complete copies of the State of Indiana 305(b) Report can be obtained from the State agency listed below:

Water Pollution Control Division
Indiana State Board of Health
1330 West Michigan Street
Indianapolis, IN 46206

Introduction

This part of the report largely focuses on the State's major streams and the waters near most of our largest cities. The report's objectives are to outline the extent to which these water bodies meet established water quality criteria and to indicate which criteria are violated.

Data Sources

The major portion of the data included in this report has been obtained from a fixed station monitoring program which was initiated in 1957. The original monitoring program included collecting bi-weekly samples from a network of 49 stations from major Indiana streams scattered throughout the State. Since 1957, the network has been expanded to include 95 stations and the number of parameters analyzed have been greatly increased. However, the fixed monitoring stations, established primarily at bridges or at waterworks intakes are not always located at points which would show maximum areas of effect of certain dischargers, nor reflect the extent of improvement that has resulted from past water pollution abatement programs that have brought about a improvement in localized areas of major streams or their tributaries.

In addition to the data obtained from the fixed station monitoring program, data from 8 intensive segment surveys conducted in 1974 and 1976, as well as a few other intensive surveys, have been included to further characterize stream quality. Discussion of intensive segment surveys is largely limited to the major stream in the segment, unless it is necessary to discuss tributary loading to explain a significant change in water quality of the major segment stream.

State of Kansas

Complete copies of the State of Kansas 305(b) Report can be obtained from the State agency listed below:

Division of Environment
Department of Health and Environment
Topeka, KS 66620

B-45

Summary

Long-term averages of water quality data from major rivers in Kansas yields the following general characterization: Turbid streams, moderately mineralized, well buffered, with good oxygen characteristics, low organic loading, high nutrient levels, and high bacterial levels. Water quality trends since 1967 on nine major Kansas rivers indicate that 66 key parametric averages have shown water quality improvement or no significant change, and 24 key parametric averages have shown water quality deterioration. Water quality in Kansas streams in the last two decades has been primarily influenced by nonpoint sources, point source contributions having had their greatest impact during the period of the 1930's through the 1950's. At present, instream quality is determined almost entirely by flow regime. During low flow periods, the most significant quality influence is the entrance of mineral inflow from natural sources. During high flow periods, most Kansas surface waters display their poorest quality, with significant increases in BOD, nutrients, bacterial numbers, and turbidity from nonpoint source contributions.

Monitoring programs for toxic substances in Kansas have accelerated in recent years due to increased concern over these substances in our waters. No significant concentrations of heavy metals have been found in major Kansas streams or lakes, except for iron and manganese which are common in major streams. Iron, zinc, copper and lead are found to varying degrees in small tributary southeastern Kansas streams which drain the coal and ore mining areas. No significant concentrations occur in mainstem streams. No significant concentrations of pesticides have been found in Kansas streams at standard detection levels during normal surveillance, nor during special studies or irrigation return flow. New criteria for monitoring pesticides at much lower standard detection levels are being proposed in the 1977 revised Kansas Water Quality Standards. The surveillance program is being expanded and more sophisticated laboratory equipment is now available to better monitor these proposed, lower pesticide standards.

Biological quality in Kansas is monitored through two programs: The stream biological network with sampling stations; and the lake network at 33 major lakes. Accounts of the organisms collected at biological sampling network stations and river basin survey stations over the five years of program operation, indicate that virtually all streams and rivers in Kansas support adequate populations of stream-dwelling organisms. Limiting factors in streams are usually unsuitable substrate or velocity patterns. It is generally found that where a diversity of substrate is present, the river supports a well-balanced macroinvertebrate community containing organisms typically associated with clean water. There is, at the present time, no evidence to indicate any problems of eutrophication of lakes due to the addition of algal nutrients. The major water quality problem of state reservoirs and other lakes appears to be periodic high suspended silt loads. It appears that the general shallowness of the lakes coupled with the frequent, moderate velocity winds and high turbidity of feeding streams will continue to make high levels of suspended solids the major limiting factor in productivity of Kansas lakes in the future.

State of Kentucky

Complete copies of the State of Kentucky 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality
Department for Natural Resources and Environmental Protection
275 East Maine Street
Frankfort, KY 40601

Summary

The quality of water in Kentucky is the result of the interactions of rain waters contacting the earth, flowing over the land, soaking into and passing through the soil, over minerals, dissolving minerals into the waters and the waters transporting materials to the streams. The materials with which water contacts on its way to a stream or lake will dictate what these waters contain once they reach a stream or lake. Inorganic materials (soil constituents, calcium, sulfate, chloride, etc.) will make up the bulk of the dissolved solids and will determine a water's hardness, acidity/alkalinity and other characteristics. Organic materials carried in the waters will affect to some degree the level of dissolved oxygen in the water through physical and biological processes in these waters.

As you read the different sections of the complete report, each written for a particular river basin, the characteristics of a river basin which have an effect on water quality will become evident. The size of a basin will determine how sensitive or insensitive to inflow and quality a river basin is. A small basin like the Salt River will react quickly to rains, while a large impounded basin like the Tennessee is relatively stable and slow to change.

The geology in a basin will affect the type of water produced. For example, within the Kentucky River Basin, Figure H-2 North Fork Kentucky River, Page 231 of the report shows waters which have contacted disturbed earth in the Eastern Kentucky Coal Fields. This water is hard, high in dissolved solids, high in sulfate, high in acidity at times and high in chlorides. In contrast, the Red River, Pine Ridge in the same river basin (Figure H-4, Page 233 of the report) shows waters which have had few dissolved solids added, are relatively soft, have normal alkalinity and are of generally high quality.

The hydrology of each river basin has been presented. The term hydrology is used here to mean a summary of the important aspects of the amount of water which has been discharged past a measuring location on a stream. Table 1 shows the relative amount which eight of the ten river basins discharge during an average year.

TABLE 1
AVERAGE DISCHARGE FROM RIVER IN KENTUCKY

Ohio River	262,000 cfs*
Tennessee River	64,000 cfs
Cumberland River	27,500 cfs
Upper Cumberland River	9,100 cfs
Green River	11,000 cfs
Salt River	3,300 cfs**
Kentucky River	7,200 cfs
Licking River	4,150 cfs
Big Sandy	4,450 cfs

NOTE: These are the most downstream stations in each basin.

*Cubic feet per second.

**Sum of the two mains streams, Rolling Fork and Salt River.

The population within a river basin will have an effect on streams due to the location and concentration of organic loads imposed on these streams. Table 2 shows the population within each basin.

TABLE 2
POPULATION IN KENTUCKY

Basin	Population 1970 census	Drainage area Kentucky	Population density no./sq.mi.
Mississippi	56,637	1,250	45.3
Ohio	993,001	6,090	163.1*
Tennessee	68,412	1,000	68.4
Lower Cumberland	92,380	1,900	48.6
Upper Cumberland	260,000	5,077	51.0
Green	426,000	8,821	48.3
Salt	507,233	2,932	173
Kentucky	534,000	7,033	105**
Licking	211,000	3,700	57.0
Big Sandy	112,000	2,285	49.5
Total	3,261,072	40,088	81.3

*Louisville, Owensboro

**Lexington

Table 3 shows the point source loads on streams which are predicted to depress the dissolved oxygen below 5.0 mg/l as a result of the population distribution within each basin. This table shows the effect of all treated effluents on streams in Kentucky in relation to the predicted dissolved oxygen content during design flows. Table 3 also shows that municipalities in Kentucky contribute 35 percent, industries contribute 7 percent, and small discharges contribute 58 percent of the organic point source loads which may cause dissolved oxygen to be less than 5.0 mg/l in Kentucky streams.

TABLE 3
POINT SOURCE LOADS IN KENTUCKY STREAMS*

Basin	Stream miles studied	Total miles	Dissolved Oxygen Predicted Less Than 5.0 mg/l		
			Municipal	Industrial	Other
Mississippi	275	84	13	26	45
Ohio	431	85	36	8	41
Tennessee	248	59	15	14	30
Lower Cumberland	360	62	40	0	22
Upper Cumberland	752	167	25	0	151
Green	1,670	214	173	6.8	34.5
Salt	596	160	61	8	91
Kentucky	868	145	119	0	26
Licking	1,000	384	89	46	249
Big Sandy	560	250	10	5	235
Total	6,760	1,609	570	114	925

*1975 Wasteload allocation from Section 303(e) River Basin plans.

State of Louisiana

Complete copies of the State of Louisiana 305(b) Report can be obtained from the State agency listed below:

Louisiana Stream Control Commission
P.O. Drawer FC, University Station
Baton Rouge, La. 70803

Summary

This report was prepared by the Louisiana Stream Control Commission pursuant to Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

Water Quality data used to prepare this report were collected from the State's Ambient Water Quality Monitoring Network operated by the Division of Water Pollution Control, Louisiana Wild Life & Fisheries Commission and the Bureau of Environmental Services, Louisiana Health and Human Resources Administration, and other State and Federal agencies participating in the United States Environmental Protection Agency's STOrage and RETrieval (STORET) Computer System.

The report is organized in detail by monitoring stations. Data from the three-year period 1974 through 1976 were used in an attempt to reflect short-term trends. These trends are temporary changes in water quality that occur during unusual natural phenomena such as high water and floods.

This third annual report on water quality will serve as a continuing review process to monitor, control and improve where possible the current water quality conditions of the streams and other surface water in Louisiana.

Data from each station in the State's Ambient Water Quality Monitoring Network for 1976 were compared with the 1974 and 1975 data that were included in the previous years' Section 305(b) Report in a further attempt to identify short-term trends. Sixteen of the stations in the monitoring network recorded no water quality criteria during 1976, while four of the stations were without violations for the entire three-year period.

The incidence of stations without violations for 1976 would probably have been higher had it not been for below-average flows across the State. Records of the U.S. Geological Survey indicate that the stream flows throughout the State were below average for the 1976 Water Year.

Review of the data included in the report indicates that no major changes in the water quality of the State's streams occurred during 1976.

The body of the report is divided according to designated Water Quality Management Planning River Basins. A basin map and description is followed by a presentation of the data for the individual stations within the basins.

No attempt has been made in this report to rank or compare all streams/stations against each other as was included in last years' report. The state is reviewing several index type programs that will provide for a ranking of similar streams and will include such a system in the report when an adequate index and data base is available. In the interim, the "Summary of Water Quality Violations" sheet that is presented for each station where violations occurred will allow the reader to make a fairly rapid evaluation of current stream conditions as compared to the individual water quality parameters included in the present *Louisiana Water Quality Criteria.*

State of Maine

Complete copies of the State of Maine 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality Evaluation and Planning
Bureau of Water Quality Control
Department of Environmental Protection
Statehouse
Augusta, ME 04330

Summary

Water quality within the State of Maine has continued to improve througout 1976. While not all treatment facilities met the October 1, 1976 deadline for adequate treatment a great many of them did come on line last year. The overwhelming majority of those that did not were held up for lack of Federal funds. Because these efforts continue the upward trend in improving State water quality, additional Federal funds are needed if these trends are to continue.

Table 1 lists the State streamwater quality classification system and the parameter considered. It has been proposed that Maine's lakes be placed under a new system and classified GP-A or GP-B. This new system has been proposed because it takes into account the trophic status of a given lake, whereas the old classification did not. The entire proposed changes to Maine's water quality program including the standard of classification are listed in Appendix A of the report.

Table 2 gives the present water quality status within the State's major river basins. As yet it is too early to measure the extent of the lasting benefits that have derived from the introduction of waste abatement facilities put into operation last year. Some portions of the State's rivers are under proposal for upgrading this year; this is reflected in Table 2. Two Water Quality Class Segments (WQS) will be upgraded. The Prestile Stream, once a very high quality stream noted for its fishing and, more recently, highly degraded from industrial discharges, has been upgraded to B-2. This was possible because the Vahlsing and Maine Sugar discharges have now terminated and Triple A Sugar and McCain's will use subsurface land disposal. The other WQS, a portion of the Aroostook River from the Wade-Washburn town line to Presque Isle Stream, has also been reclassified as B-2. The segment on the Aroostook River from Presque Isle Stream to the Canadian border still remains a WQS. This upgrading was enabled by the discharge from Taterstate now being treated by flood irrigation.

TABLE 1
STATE STREAM WATER QUALITY STANDARDS

Stream Classification	Water uses	Parameter	Standard
A	Recreational purposes Water contact recreation Water supply (after treatment) Fish and wildlife habitat	Dissolved oxygen	≥75% saturation
B-1	Recreational purposes Water contact recreation Water supply (after treatment) Fish and wildlife habitat	Dissolved oxygen Fecal coliform Chromium	≥75% saturation or ≥5 ppm ≤60 per 100 ml ≤50 ug/liter
B-2	Recreational purposes Water contact recreation Water supply (after treatment) Fish and wildlife habitat	Dissolved oxygen Fecal coliform Chromium	≥60% saturation or ≥5 ppm ≤200 per 100 ml ≤50 ug/liter
C	Recreational boating and fishing Fish and wildlife habitat	Dissolved oxygen Fecal coliform	>5 ppm (unless naturally occurring) but in no case <4 ppm ≤1000 per 100 ml
D	Power generation Navigation Industrial process waters	Dissolved oxygen Fecal coliform	>2 ppm numbers which will not cause undue health hazard

TABLE 2
STATE OF MAINE—305(b) WATER QUALITY INVENTORY SUMMARY

1	2	3	4	5	6	7*	8	9
River basin or coastal drainage (including main-stem and major tributaries)	Total miles	Miles *now* meeting Class B (fishable/ swimmable)	Miles expected to meet Class B by *1983*	Miles *now* meeting State WQ standards	Miles *not* meeting State WQ standards	Water quality problems	Point source causes of WQ problems M=Municipal I=Industrial	Nonpoint source causes of problems 1=Major 2=Minor 3=N/A
Penobscot	379	180	364.4	364.4	14.6	4,5,6	M.I	3
Kennebec	325	200	263.2	263.2	61.8	4,5	M	1
Androscoggin	320	150	313.7	313.7	6.3	1,2,5,6	M.I	2
St. John	351	269	308.2	289.3	61.7	2,5,6	M.I	1
Salmon Falls Piscataqua	157	120	157	157	—	5,6	M	2
Saco	230	212	227.5	227.5	2.5	1,5,6	M.I	2
St. Croix Main Stem and Monument Brook	87	47	77	77	10	5,6	I	3
Presumpscot	58	21	58	51.3	6.7	5,6	M.I	2
Mousam	23	5	10.9	10.9	12.1	3,5,6	M	2

*Column 7-*Water Quality Problems:* 1. Harmful substances; 2. Physical modification (suspended solids, temperatures, etc.); 3. Eutrophication potential; 4. Salinity, acidity, alkalinity; 5. Oxygen depletion; 6. Health hazards.

Other classification changes are given in Appendix A of the report.

Water Quality Management Planning under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 has done much in the way of investigating causes and ways of improving the water quality in the State. The two-year program undertaken by the five designated areas is due for completion this summer and the Statewide program which covers the rest of the State is just getting underway. If the full value of the discoveries and investigations undertaken by these agencies along with the processes necessary to properly implement the completed plan are to be realized, more Federal funds are going to be needed. Studies that were undertaken by the designated agencies will be utilized and applied by the Statewide agencies for their respective areas. This will be necessary due to the greatly reduced level of funding available for planning in the remainder of the State. The completion of the Section 208 plans and the implementation of its recommendations should greatly improve water quality in Maine.

In the past, nonpoint source pollution has been largely ignored as a source of water quality degradation. Its existence had been accepted, but little investigation had been done due to the difficulty of identifying it and the problems associated with its correction. Recently however, an increased effort has been taken towards the nonpoint source problem primarily through the Section 208 program. The chief contributions to the problem come from agricultural, silvicultural and construction activities, along with malfunctioning private septic systems which contaminate ground and surface waters. Continued effort is needed in these areas to enable the State to effectively carry out its actions to improve the State's water quality so that 1983's goals can be met wherever possible and, at the same time, apply fair and equitable treatment to Maine's citizens and its industry.

State of Maryland

Complete copies of the State of Maryland 305(b) Report can be obtained from the State agency listed below:

Maryland Environmental Service
Tawes State Office Building
Annapolis, MD 21404

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Current Water Quality Trends and Control Programs

Tables A-1 through A-18 of the report provide a brief description and analysis of water quality by basin. For segments with problem areas, water quality is described in reference to the intended use.

The first, or left-hand column, of each table presents a listing of segments violating fishable and swimmable standards, cites the specific violation, and states applicable water quality severity scores. The water quality scores are measures of the severity of pollution in each segment. The highest score (50) indicates a severe standard violation or that a water use has been precluded. The second highest score possible is 30, which indicates occasional or not extensive standards violation. A segment can also receive a score of 10 or 0 but these ratings were not used in Table A. The segments were scored by the Planning Section (Water Resources Administration) as an on-going part of the Phase I and Phase II Water Quality Management Planning Effort pursuant to Sections 303(e) and 208 of PL 92-500, respectively.

The second column outlines probable reasons for not meeting fishable and swimmable standards. The reasons are separated into point and potential nonpoint source contributions. The third column, *Control and Inventory Program,* is also divided into point and nonpoint categories. A breakdown of land uses in the segment by percentages is included in the nonpoint category. Phase II Water Quality Management Plans will address in detail nonpoint controls and inventory procedures. The goal of Phase II Water Quality Management Plans is to assess nonpoint sources and to define Best Management Practices (BMP) for land uses in order to control pollution from those sources. Definitions of Best Management Practices will evolve during the Phase II planning period. For this section of the report it will suffice to note that BMP's will need to be determined and implemented for the land uses listed in each segment.

The most frequently employed point source control measure listed is municipal sewerage upgrading. The vast majority of municipalities and sanitary districts are utilizing Section 201 construction grants projects funds to finance this upgrading. Under this arrangement, the Federal government funds 75 percent of a project, with the State and applicant each funding 12.5 percent of the costs. There are three distinct steps in the development of sewerage projects. Step One is the facilities planning phase, which considers various sewerage alternatives. Areas experiencing failing septic systems are addressed in Step One. Step Two is the design of the chosen sewerage alternative and Step Three is the actual construction.

All domestic wastewater treatment facilities are required by discharge permit and regulation to maintain a DO of not less than 4.0 mg/l (5.0 mg/l in some cases), a coliform not to exceed 200 mpn/100 ml fecal or 70 mpn/100 ml total depending on the location of the discharge, and total residual chlorine not to exceed .01 mg/l to 0.5 mg/l depending upon the location and size of the discharge. In specific cases, the State has specified effluent limits more stringent than the EPA's definition of secondary treatment in order to meet water quality standards. In some of these cases phosphorus and/or nitrogen limits have been included.

The State requires more than Best Practical Technology for industrial discharges when necessary to meet water quality standards. Upon revision of NPDES permits, the State will be requiring, by 1983, Best Available Treatment in all cases.

The final column, titled *1983 Forecast,* briefly describes expected water quality improvement and related control measures.

Water Quality Goals

The Federal Water Pollution Control Act Amendments of 1972, the law that initiated this report, states that:

> The objective of this Act (PL 92-500 is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. In order to achieve this objective, it is hereby declared that, consistent with the provisions of this Act—
>
> (1) It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985; and,
>
> (2) It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

The "Maryland Water Quality-1977" report addresses the 1983 interim goal of fishable and swimmable waters. In determining if a water segment was fishable and swimmable a cross section of data was utilized. The data sources employed can be categorized into four groups: (1) Promulgated Maryland water quality standards; (2) results of sampling conducted by the Water Quality Services Section; (3) observations and findings recorded by the Planning Section, local officials, and citizens; and (4) information provided by Planning staff members assigned to the water-use specialty categories of water supply, water contact recreation, finfish, shellfish, and wildlife. In most segments the determination of fishable and swimmable water was arrived at by the synthesis of these data sources.

Where applicable, Regulation 08.05.04.03, Specific Standards for Water Quality, prepared by the Maryland Water Resources Administration, was used extensively. In Maryland, each navigable body of water has been classified according to the most critical use for which it must be protected as follows:

Class I:	Protected for contact recreation, for fish and other aquatic life, and for wildlife (such protection is sufficiently stringent to protect for use as water supply).
Class II:	Protected for shellfish harvesting.
Class III:	Protected as natural trout waters.
Class IV:	Protected as recreational trout waters (waters capable of holding adult trout for put-and-take fishing).

For each of these water-use classes, specific standards have been set to delineate maximum or minimum allowable levels of fecal coliform bacteria, dissolved oxygen, temperature, pH, and turbidity. These are displayed in Table 1-1 of the report. As yet, there are no generally applicable standards for nutrients, heavy metals, pesticides, and numerous other potential pollutants. Federal law requires that these standards be reviewed at least once every three-year period following the date of enactment of PL 92-500 so that they may be refined as knowledge of water and human ecology improves.

In the context of this report, if a water segment does not meet all of the Class I standards it is considered in violation of swimmable or water contact recreation standards. Thus, a segment can contain excellent water quality overall yet have standard violations in one tributary and thereby be designated as non-swimmable. In Maryland, bacteria is the Class I standard or parameter violated most often. Bacteria is also the primary parameter investigated when determining if the water quality of a bathing beach is a threat to public health.

If a Class I standard violation is known to also stress a segment fishery, it is so recorded. Class I violations for temperature, dissolved oxygen, pH, and turbidity will often stress or preclude fishing activities. However, if a Class I standard has been violated yet the fishery is not stressed, the segment is specified only as non-swimmable.

The bacteria standards for Class II or shellfish waters, must be more stringent than Class I because viruses and bacteria are retained in shellfish, which are frequently eaten uncooked. The Maryland Environmental Health Administration is directly responsible for monitoring and making determinations on shellfish water closures or openings. This determination is based on the bacteriological analysis of those waters. Water sampling and shoreline surveys are conducted on a continuing basis and areas are closed if the water quality does not meet prescribed standards for shellfish harvesting. Conversely, when water quality again reaches prescribed standards and criteria, areas previously closed are reopened and remain open as long as shellfish water quality standards are met. If a portion of a water segment contains shellfish closures, the entire segment is specified as violating fishable standards.

Except for more stringent dissolved oxygen and temperature parameters, the Class III (Natural Trout Waters) and Class IV (Recreational Trout Waters) standards are identical to the Class I standards. If a Class III or IV water segment exceeds DO or temperature standards, the segment is designated as non-fishable.

The Water Quality Services Section conducted trend sampling work in every sub-basin and intensive surveys in selected segments during 1976. In segments which received intensive surveys, the sampling analysis served as the primary data source. For the segments not sampled, data were provided by previous 305(b) reports. As previously indicated, the *Maryland Water Quality-1975* report was very detailed and provided information for each segment. The *Maryland Water Quality-1976* was simply an update of the previous year's report and not nearly as detailed.

Sampling work and subsequent analysis conducted by the Water Quality Services Section served as the data base for *Section 9-Water Quality Analysis* in the Phase I Water Quality Management Plans. The plans have been extensively used by State agencies, representatives of local governments, and citizen members of the Public Advisory Council in each sub-basin.

State of Massachusetts

Complete copies of the State of Massachusetts 305(b) Report can be obtained from the State agency listed below:

Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building
Government Center
100 Cambridge Street
Boston, MA 02202

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Summary

The Commonwealth of Massachusetts is divided into twenty-seven major drainage basins for the purpose of water quality management planning. Together, these basins drain some 9,645 square miles and comprise 1,462 major river miles. There has been a great deal of improvement throughout the State over the past year. However, evaluation of these improvements is not possible at this time due to data constraints. This is best indicated by the fact that only 32.2 percent of Massachusetts' major river miles are now known to be meeting state water quality standards—an improvement of only 1.4 percent over last year's figure.

Although the present quality of many of the State's streams is below desired levels, the causes of degradation are known and the necessary abatement measures have been given high priority so that 1983 fishable/swimmable goals can be met. Costs for construction of publicly-owned wastewater treatment facilities to help reach these goals have been assessed at $3,400,433,000[*] according to the 1976 needs survey.

It appears from analysis of preliminary data that nonpoint sources are a significant source of water pollution in many of Massachusetts' river basins. Evaluation of the extent and methods of controlling these sources will be addressed in the Areawide Wastewater Management Plans currently being prepared.

[*] A copy of the *1977 Facilities Needs Survey* will be appended to this report when it becomes available.

TABLE 1
COMMONWEALTH OF MASSACHUSETTS 305(b) WATER QUALITY INVENTORY SUMMARY

Drainage basin		River basin or coastal drainage (main stem and major tributaries)	Total miles assessed	Miles now meeting class B	Miles expected to meet class B by 1983	Miles now meeting state WQ standards	Miles not meeting state WQ standards
Blackstone		328	106.8	35.7	*	35.7	71.1
Boston Harbor			43.7	0.0	*	6.9	36.8
Buzzards Bay		350	44.5	16.5	*	37.0	7.5
Charles River		265	80.0	1.4	*	1.4	79.4
Chicopee		720	111.5	49.4	*	72.2	39.3
Connecticut		2,949	67.5	5.5	*	5.5	62.0
Deerfield		666	69.9	38.3	*	44.3	25.6
Farmington	(total)	602	18.4	18.4	*	18.4	0.0
	(Mass.)	149					
French and Quinebaug		241	56.6	19.1	*	23.1	33.5
Hoosic	(total)	713	42.6	17.3	*	19.6	23.0
	(Mass.)	165					
Housatonic	(total)	1,950	96.3	26.4	*	30.9	65.4
	(Mass.)	500					
Ipswich and Parker			66.4	33.6	*	33.6	32.8
Merrimack	(total)	5,000	115.4	0.0	*	0.0	115.4
	(Mass.)	1,200					
Millers	(total)	390	57.5	17.3	*	17.3	40.2
	(Mass.)	350					
Nashua		530	103.7	5.4	*	5.4	98.3
North River		105.4	20.6	11.6	*	11.6	9.0
Suasco		381	86.1	0.0	*	0.0	86.1
	Sudbury	169					
	Assabet	175					
	Concord	27					
Taunton		530	134	18.0	*	35.2	98.8
Ten Mile		49	38.1	3.8	*	3.8	34.3
Westfield		517	114.2	68.7	*	73.4	40.3
Total		9,995.4	1,474.1	386.4		475.3	998.8
% of total miles				26.2%		32.2%	67.8%

*Information not available at this time. As it becomes available, it will be included in the appropriate annual update of the Section 305(b) submittal.

State of Michigan

Complete copies of the State of Michigan 305(b) Report can be obtained from the State agency listed below:

Environmental Protection Bureau
Department of Natural Resources
Stevens T. Mason Building
Lansing, MI 48926

B-61

Summary and Conclusions

What is the Present State of Michigan's Water Quality?

Streams

Stream water quality is good, on the average, throughout much of the State. Water quality declines somewhat in the southern portion of the Lower Peninsula due to urban and agricultural activity. Still, there are several areas in this part of Michigan which are not subject to degradation from point source discharges, and remain in the good water quality range.

Long-term trends for selected rivers show gradual to marked improvement, as measured by the water quality index. Phosphorus decreases are primarily due to decreased point source inputs.

Inland Lakes

Approximately 40 percent of all Michigan lakes are experiencing accelerated aging (eutrophication). The major cause of eutrophication is excessive nutrient input to lakes, from both point and nonpoint sources. It is important to note that these inputs can come from the entire lake watershed, not just from shoreline inputs.

Great Lakes

Toxic materials continue to have a major effect on fisheries programs in Michigan waters. There has been a decline in DDT concentrations in Lake Michigan chubs, coho salmon, and lake trout. But Dieldrin concentrations in chubs and lake trout from Lake Michigan have increased. Although Michigan point source inputs have been greatly reduced, PCB concentrations in Great Lakes fish fail to show any significant decline.

Water and biological quality in the nearshore Michigan waters of the Great Lakes is generally good to excellent. There are a few localized areas where enrichment or degradation due to waste discharges has lowered this high overall quality.

There has been a general improvement in the quality of the Detroit River during the past ten years. Corrective programs have brought about significant reductions in pollutant inputs from point source discharges. This has resulted in improved Detroit River water quality and reduced pollutant inputs to Lake Erie.

How is Michigan's Pollution Abatement Program Working?

Industrial

Since 1929, most of the effort for pollution control has been directed at improving the quality of point source discharges. Voluntary Stipulations, Orders of Determination, and now, NPDES Permits have provided the driving force to industries and municipalities to stop or reduce polluting discharges. Most dischargers will be required to meet final NPDES Permit limits in the third quarter of 1977. At the end of 1976, 40 percent of the principal industrial dischargers had met their limits. Michigan feels most industries will achieve the required effluent quality on time. However, individual facilities which cannot achieve best practical control technology by July 1, 1977 may require an extension.

Pollution Incident Prevention Plans require measures which have reduced the number of accidental losses of oil and other hazardous materials. The Pollution Emergency Alert System has resulted in more spills being reported. Consequently, more of the spills have been dealt with, and more of the material recovered than ever before.

Municipal

Municipal point source pollution is being reduced by construction of new or improved treatment works. Also, the State is assisting treatment works operators to run their plants at top efficiency. However, more effort is needed in this area. Construction of treatment works is promoted through the Construction Grants Program. Local communities provide 20 percent of the cost, with the State and Federal governments supplying the rest. Federal regulations slow down the allocation of these funds, resulting in delays in construction. These delays cause much of the money to be lost to inflation. Michigan proposes to be delegated most of the program responsibility in order to speed up this process.

Despite funding problems, many municipal plants have improved the quality of waste discharged. Total phosphorus and BOD leadings from these plants continue to decrease despite larger volumes of raw sewage being treated.

Phosphorus Control

Phosphorus is a key nutrient in the aging (eutrophication) process of lakes. Michigan has addressed this problem by requiring 80 percent phosphorus removal at municipal wastewater treatment plants. Currently the 80 percent goal is being met at municipal plants serving only 20 percent of the State's population. Construction grant delays are primarily responsible. In addition to phosphorus removal, Michigan has proposed a ban on phosphorus in household laundry detergents. These detergents contribute 40 percent of the total phosphorus in raw sewage. By reducing this, the treatment plants will have less phosphorus to remove.

Toxic Materials Programs

New programs are now underway to control toxic materials in the environment. These include the PCB Control Act, creation of the Office of Toxic Material Control, the Critical Materials Register, Pollution Incident Prevention Plans, and sludge disposal guidelines.

Water Quality Standards

In order to better attain the national water quality goals of 1983 (fishable and swimmable water), Michigan has proposed new water quality standards. Minimum dissolved oxygen levels would be raised to provide greater protection for aquatic life. Also, all State waters would be designated for total body contact, except for some locations downstream of wastewater treatment plants or combined sewer overflows.

What Are the Costs of These Programs?

Municipal Costs

Municipalities will generally be required to meet secondary treatment requirements, pass and enforce sewer ordinances, regulate industrial wastes in their system, revise user charges, and establish cost recovery programs. These costs, which total $6.6 billion cannot possibly be met without a continuation of the Construction Grants Program.

Industrial Costs

Industries are required to meet effluent limitations, sample and analyze their wastewater, and report regularly to the pollution control agencies. To meet these limits considerable costs are incurred. These costs are borne directly by the dischargers themselves, who are not eligible for government grants. The result, in most cases, is the raising of prices.

Agency Costs

Regulatory agencies must issue and enforce permits, award construction grants, conduct studies, and monitor receiving waters. Thus almost everyone is paying for the cost of water pollution control, through both taxes and higher prices for products.

State of Minnesota

Complete copies of the State of Minnesota 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality
Minnesota Pollution Control Agency
1935 West County Road B-2
Roseville, MN 55113

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B-65

Summary

Water quality conditions of 26 rivers plus Lake Superior are assessed in this report. The rivers are grouped and presented according to the eleven basins. The study utilized chemical and physical data from a total of 75 state monitoring stations for the water year 1976. Primary network monitoring stations used in this report are normally located at points representative of the most critical reaches in a stream. Therefore, the average water quality of the stream as a whole will generally be better than the quality at specific monitoring stations.

The existing water quality in each basin was compared with the national goal of "fishable", "swimmable" water which is to be achieved by July 1, 1983. In lieu of any further clarification by the Environmental Protection Agency (EPA) of what is meant by this objective, this goal is commonly equated to class 2B in the State of Minnesota water quality standards. Thus, the frequency of violations of the State water quality standards is indicative of which areas and to what extent this goal has been achieved in Minnesota.

This study indicated that the majority of the rivers in the State are currently in conformance with this goal. However, large areas of particular rivers and a substantial number of localized areas presently appear to be in *noncompliance* with applicable water quality regulations and the interim goal. A total of 23 percent of the 75 water quality monitoring stations assessed in this report are considered to currently be in noncompliance with either the "fishable" and/or the "swimmable" aspect of the 1983 goal. Rivers or reaches of rivers placed in this category are the Mississippi River below Minneapolis-St. Paul, Zumbro River below Rochester, Cedar River below Austin, Buffalo Creek below Glencoe, Center Creek below Fairmont, and the headwater tributaries of the Missouri and the Des Moines rivers.

Assuming that the current grant programs are continuing at existing funded levels, it is expected that the Missouri and the Des Moines rivers headwater tributaries and the metro segment of the Mississippi River, or 11 percent of the total 27 waterways assessed, will not conform with the interim goal by 1983. The reason for this projected inability of these rivers to conform with the goal by 1983 is primarily money. In the Des Moines and Missouri rivers headwater tributaries, increased funding is necessary to both upgrade inadequate municipal treatment facilities and implement rigorous nonpoint source regulatory controls. These two watersheds have particularly acute nonpoint source problems attributable to both agricultural activities and natural conditions. In the Twin Cities metro segment of the Mississippi River, it appears that massive amounts of funds would be required to control or eliminate combined sewer overflows, to control urban runoff, and to better insure the removal of pathogens from municipal treatment plants so that the fishable-swimmable goal can be met.

Even if all industrial and municipal point sources are brought into compliance, nonpoint loadings will continue to cause and contribute to many water quality problems in Minnesota. This is particularly apparent in the watersheds where agricultural activities are the dominant land use. There is a potential that agricultural activities may be adversely affecting the water quality in much of the State. The highest potential areas are the south central and southwestern sections of the State. In the Minneapolis-St. Paul Twin Cities metro area and in the other urban centers of the State, urban storm water runoff is a major water quality problem. Other significant types of nonpoint sources which impact water quality in Minnesota include silviculture, mining, residual waste disposal, construction activities, and dredging. The Minnesota Pollution Control Agency is actively involved in continuing statewide planning to develop programs for the control or abatement of nonpoint source pollution. Key programs in this effort include Section 208 areawide planning, in the Twin Cities metro area, and outstate, and the ongoing activities of the many local, State, and Federal agencies which have traditionally been involved in programs related to nonpoint source control.

Many municipal treatment facilities with construction needs are being delayed until Federal funds can be obtained by the community. Current levels of Federal funding for municipal wastewater treatment plants and the control of nonpoint sources are hopelessly insufficient when considered in relation to the total estimated needs in Minnesota. The 1974 Municipal Needs Survey of Minnesota indicated that the total municipal needs, excluding storm water treatment, are approximately $1,608,000,000 (1976 dollars).

The Soil Conservation Service (SCS) estimates the cost to adequately control nonpoint sources of pollution from cropland and pastureland would total approximately $320 million (1975 dollars) and would result in an estimated 45 percent reduction in waste loadings. Reducing streambank erosion would require multi-million dollar expenditures, while corrective measures on lakeshore erosion are estimated at $400 million (1975 dollars). Similarly, the SCS estimated the cost of programs to correct erosion in roadside right-of-way areas at $15 million (1974 dollars).

Annual cost estimates have also been developed for control of runoff from urban construction sites. Statewide annual costs are estimated at $6 million (1975 dollars), of which approximately $3.8 million is attributable to construction activities in the Twin Cities metro area.

Recommendations

1. If the interim goal of the Act for swimmable waters is to be achieved on a statewide basis in Minnesota by July 1, 1983 or, for that matter, by any later date, adequate funding must be allocated for the planning and the construction of municipal wastewater treatment plants, corrective programs for nonpoint sources and the administration of existing State programs.
2. In recognition of the water pollution control improvements which have been achieved and the initiative

which has been demonstrated by the State regulatory agencies, it is recommended that the implementation of the provisions of the Act continue to be administered on the State level in conjunction with and in support of existing State programs.

3. The State 305(b) reports should be required on a biennial basis rather than on the current yearly basis. State efforts could more profitably be channeled into direct pollution abatement activities while still reporting progress every two years.
4. Additional funding should be allocated by the Federal government to the States for expanding additional monitoring activities.
5. In order to meet the interim and subsequent goals of the Act throughout the entire State of Minnesota, local and Federal funds will have to be used for the control of nonpoint sources. An adequate nonpoint source control program will require a close working relationship and increased funding for the many regulatory governmental agencies which are directly involved in the control of nonpoint sources.
6. Nonpoint source (NPS) pollution control is, to a great degree, dependent upon an informed populace. Both urban and rural NPS pollution could be significantly lessened if each citizen understood how his actions ultimately affect the State's water quality.
7. Funds should be allocated to support the Section 314 "Clean Lakes" program as outlined in the Act.

State of Mississippi

Complete copies of the State of Mississippi 305(b) Report can be obtained from the State agency listed below:

Mississippi Air and Water Pollution
Control Commission
P.O. Box 827
Jackson, MI 39205

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Summary and Recommendations

It has been stated that "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983".

The water referred to here is defined as meaning any and all surface water systems which are confined, impounded, or free-flowing, and containing water for any period of the year. This literally includes tens of thousands of lakes, streams, ditches, and drainage canals, the majority of which are dry or nearly dry except during periods of heavy rainfall. Although these waters are required and projected to meet "fishable, swimmable" standards, it is ridiculous to believe that anyone is going to be able to fish and swim in a ditch which contains only a few inches of water.

Nevertheless, there are about 500 streams in the State, including these small streams, tributaries, and ditches, which are not considered to be meeting the "fishable, swimmable" standards. If it is assumed that there are at least 25,000 streams, lakes, tributaries, and ditches within the State, then 98 percent of these waters are currently meeting "fishable, swimmable" standards.

However, if the small tributaries and ditches which have no potential for fishing or swimming are excluded from this estimate of total streams, the list contains only about 1,000 bodies of water. Of this list, only about 78 (about 8 percent) are considered to be not meeting "fishable, swimmable" standards. These streams should be the major focus of attention in future control programs, although it will be the goal to address the entire 500 streams not meeting applicable standards.

There are indications of streams in the State in which it can definitely be said that the violations of water quality are not man-made. These streams include the upper reaches of the Jourdan River and Black Creek in south Mississipi. Measurements of pH have been recorded with values ranging from 3.5 to 5.5, all of which are below the pH standard for fish and wildlife streams.

Since there are no discharges into this segment, the unusually low pH measurements have been attributed to the low pH of groundwater, highly acidic soil conditions, and the runoff from swampy areas where tannic acid production is allowed to build up. Indeed, the lowest pH values recorded have been during and after a heavy rainfall incident.

Acidic soil conditions and dense pine tree forest are quite common throughout the southern portion of Mississippi, causing most streams in this area to be naturally acidic. However, no other stream other than the Jourdan River is known to be so consistently and grossly in violation of the normal pH values. This one case constitutes about 0.1 percent of the total streams in the State in which natural conditions alone cause violations in water quality standards.

The State of Mississippi has been in the past, and is now, basically a rural State. The urban-industrial complex, with which massive pollution is most often associated, exist only in one area of the State; that being the eastern portion of the Mississippi Gulf Coast. Although several urban type areas exist within the State, pollution problems resulting from this urbanization are relatively insignificant.

State of Missouri

Complete copies of the State of Missouri 305(b) Report can be obtained from the State agency listed below:

Clean Water Commission
Capital Bldg., Box 154
Jefferson City, MO 65101

B-71

Summary

The 1977 report contains seven major sections:

1. A summary.
2. An introduction.
3. A review of surface water quality in each of the eight major basins of the State, and a discussion of groundwater quality.
4. A discussion of water pollution control activities in Missouri.
5. Assessment of nonpoint water pollutants.
6. A statement on attaining the 1983 goals of PL 92-500.
7. A discussion of the environmental impacts, costs, and benefits of water pollution control activities in Missouri.

The introduction discusses the hydrology and stream classification system in Missouri. The great differences in geology within the State have led to the development of stream systems which have great range of hydrologic characteristics. Northern Missouri is glaciated, has a high percentage of fines in its soils, and along with western Missouri is underlaid by impermeable Pennsylvanian deposits which restrict the downward movement of water to recharge the aquifers of the area. The Ozarks have coarser, thinner soils, and no Pennsylvanian deposits. Consequently, infiltration of water through the soil to the limestone and dolomite bedrock is rapid. Therefore, while north Missouri stream flows rely mainly on rainfall, and groundwaters recharge very slowly, in the Ozarks the groundwater is recharged rapidly and emerging groundwaters (springs) sustain stream flow between rains. These hydrologic differences and their attendant water quality differences are reflected in the stream classification system which recognizes the management potential of these different systems.

The water quality assessment discussed three aspects of surface water quality in each of eight major basins within the State. These three were a listing of known violations of Missouri's proposed water quality standards during 1976, a discussion of basin-wide water quality problems and a discussion of specific water quality problems in particular streams or stream segments. The State of Missouri, in its water quality standards, recognized 14 beneficial uses of water in the State. Three of these uses had water quality criteria which were known to be violated during 1976. This information is summarized in Table 1. It should be noted that some nonpoint source pollutants such as sediment do not have an established standard and are therefore not reflected in Table 1, even though problems may exist.

Specific water quality problems usually manifest themselves only locally and the impact of the problem is felt only in one stream or one segment of a stream. This report identifies strip mine acid seepage, drainage or seepage from abandoned lead and zinc mines, effluent discharges from sewage treatment plants and active heavy metal mining and milling and heated effluents as specific problems.

Basin-wide problems identified in this report include the undersirable hydrologic characteristics of northern Missouri streams and the organic loading of most streams by cities and towns. The hydrologic problems of high runoff rates cause high concentrations of suspended sediments, phosphorus and fecal coliforms in streams during high flows and the inability of the groundwater to sustain flow between rains. These problems are geologic in origin and are aggravated by land use practices which encourage runoff or leave the soil unprotected. Since almost every stream of any size in the State of Missouri receives treated and/or untreated domestic or industrial wastes, the loading of these streams with effluents, particularly organics, is a basin-wide problem. The problem becomes most severe in those basins where base flows are low and the addition of oxygen demanding wastes seriously depletes the stream of its dissolved oxygen supply.

Groundwater quality is largely a reflection of geology in the State. In the northern and western parts of the State, groundwater recharge is slow due to the presence of impermeable Pennsylvanian deposits. These groundwaters not only have low yields, but are high in salts. In the Ozarks, groundwater yield and quality are high, but studies by geologists and hydrologists have shown that surface water quality problems can be rapidly transferred to the groundwater. Furthermore, the movement of groundwaters in the soluble limestone bedrock of the Ozarks is much more complex than the movement of surface waters. Groundwaters cross surface watershed divides so that water quality problems originating in one basin can be manifested in another.

TABLE 1
SUMMARY OF PROPOSED WATER QUALITY STANDARDS VIOLATIONS IN 1976

	Proposed Standards Violated by Use Classification		
Basin	Aquatic life	Drinking water	Propagation of coldwater fisheries
Des Moines	Dieldrin	Iron	
Salt	Mercury		
Grand-Chariton		Manganese	
Lower Missouri	Ammonia Dissolved oxygen Temperature PCB Mercury Dieldrin	Iron Manganese	
Osage-Gasconade		Manganese	
Grand Neosho			
White	Dissolved oxygen		Dissolved oxygen
St. Louis	Cadmium		
Meramec			
Cape Girardeau Area			
St. Francis/ Little	Cadmium Mercury		

Several kinds of water pollution control activities are currently underway in Missouri. In the area of municipal waste, the Missouri Department of Natural Resources, Water Quality Program, administers a grants program which reviews plans and allocates funds for wastewater treatment related construction. The department also administers a wastewater treatment operator training program and has a laboratory program which systematically monitors the quality of effluents from municipal wastewater treatment plants.

Discharges to the waters of the State, including all municipal discharges, are included in a permit program, also run by the Department of Natural Resources. Table 2 shows the status of the program.

TABLE 2
STATUS OF NPDES PERMITS IN MISSOURI, JANUARY 1, 1977

	Major municipal	Minor municipal	Major non-municipal	Minor non-municipal
Number of permits in force	80	600	60	2,000
Number of above permitees not in compliance with permit limitations	4	14	5	45
Number of permits with final limits in effect by Jan. 1, 1977	24	44	22	219

The Department of Natural Resources also regulates the disposal of solid wastes to insure that all such areas are maintained in a sanitary condition and that the environment is protected, including surface and groundwaters. An animal waste management program, also run by the department, stresses no discharge facilities by disposing of all wastes on cropland or pasture.

The section of the report on nonpoint pollution sources indicates the importance of sediment in regulating water quality, particularly in the predominantly agricultural north and western parts of the State. The direct relationship of sediment concentration and total phosphorus concentration is shown for several streams in Missouri. Available information on pesticide concentrations in streams within Missouri is given. In some cases it is possible to demonstrate that the highest concentrations of herbicides 2,4-D and 2,4,5-T occur at high stream flows and therefore appear to be associated with surface runoff.

Heavy metal problems come from both point and nonpoint sources. Most nonpoint metals problems are associated with low base flows and lack of dilution.

The status of Missouri's ability to meet the PL 92-500 goals of fishable, swimmable waters by 1983 is reflected in Missouri's stream classification system. Except where small size excludes swimming, all Class A waters meet these goals. Class B waters are unacceptable for swimming. Most of the permanent flow streams of northern Missouri are Class B streams due to turbidity, low summer flows, and the loss of deep pools to sediment. As mentioned before, the causes for the Class B rating are the geology and soils of the area aggravated by present land use. A list of all streams and lakes now meeting the 1983 goals and location maps are given in the introduction. At present no evidence points to a change in status of any of these streams prior to 1983.

The final section of the reports suggests that the adverse environmental impacts of water pollution control are not sufficient to override the beneficial impacts. This opinion is made in view of the acceptability of such environmentally controversial projects as the Truman Reservoir, the Meramec Reservoir, and the Callaway County Nuclear Power Station. No new information on costs or benefits of water pollution control are included in this report.

State of Nebraska

Complete copies of the State of Nebraska 305(b) Report can be obtained from the State agency listed below:

Water Quality Section
Water Pollution Control Division
Department of Enviromnental Control
P.O. Box 94653
State House Station
Lincoln, NB 68509

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Summary

Water quality was assessed in each of Nebraska's thirteen river basins. Assessment in most basins was predominantly based on low-flow conditions and may not be indicative of actual water quality trends or pollution abatement success in 1976. The four approaches used to determine water quality trends include: Instream assessment; comparison to historic data; comparison to Water Quality Standards; and an evaluation of the attainability of the 1983 goals.

Low-flow conditions existed throughout Nebraska during 1976. Numerous fish kills, along with unusual parameter concentrations, resulted from reduced flows and dewatered streams. An average annual precipitation deficit, along with excessive surface-water pumping for irrigation, caused the flow problems. Generally, water quality changes which occurred from the upper to the lower reaches of streams throughout the State were similar to changes in the past. Low-flow conditions, nonpoint source runoff, grazing activities, small feeding operations, and irrigation return flows appear to have contributed most dramatically to the increased parameter concentrations.

Generally, surface water quality throughout the State improved as compared to the quality which existed before 1973. Historic comparisons revealed water quality parameter improvements in 17 percent of the samples studied. Of the samples studied, 6 percent showed parameter degradation, while the remaining 77 percent of the samples appeared to be relatively unchanged. Only three basins (Big Blue, Little Blue and Republican) in the State experienced more parameter degradation than improvement.

The parameters showing the most consistent improvement throughout the State were dissolved oxygen (37 percent), sodium (37 percent) and turbidity (24 percent). The parameters showing the greatest degradation were total dissolved solids (11 percent) and chlorides (19 percent). When considering the entire State, all parameters studied exhibited greater improvement than degradation. Improvement in pollution abatement practices were evident throughout the State, but are not the only explanation of improved quality; fewer rainfall events and less runoff were also factors.

A comparison of 1976 data to both the general and specific numeric criteria listed in Nebraska's Water Quality Standards was made to determine the parameters in most frequent violation. The parameters used for the comparison were dissolved oxygen, pH, conductivity, chloride, total dissolved solids and fecal coliforms. Results of this comparison are found in Appendix B of the Report. Throughout the State, fecal coliform violations were most prevalent (19 percent). These bacteria counts may be contributed by point source discharges, riparian grazing activities and feedlot runoff.

A water quality which will support indigenous fish and wildlife populations is anticipated in 97 percent of the State's surface water segments by 1983. The attainability of the desired criteria for safe swimming by 1983 in many areas is unknown due to the paucity of the fecal coliform data. It is anticipated that 49 percent of the surface water segments will attain the swimmable goal by 1983. Seven percent of the segments appear incapable of meeting this goal. The remaining 44 percent of the State's surface water segments are extremely questionable as to whether they meet a safe swimming criteria within the remaining time allotment. Attainment of this goal by the segments in question are dependent upon the needs discussed in Water Uses Relative to Achieving Goals, Page 249 of the report. Bacteria levels as indicated by fecal coliform values are the most pressing problem in the State relative to meeting the 1983 goals.

Last year, point source control programs made considerable gains in restoring and maintaining Nebraska's water quality. The July 1, 1977 goal of secondary treatment for publicly owned wastewater treatment facilities is being met by approximately half of the State's municipalities. The availability of monies through the construction grant program was the greatest limiting factor for the facilities unable to achieve secondary treatment. Only two of 215 industrial wastewater treatment facilities are unable to meet best practicable control technology at this time.

Because of the large number of feedlots in Nebraska, not all livestock waste control facilities are in compliance with the July 1, 1977 goal. Nearly 75 percent of the feedlots requiring control facilities have completed construction.

The Department of Environmental Control recommends that several changes be made in the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). Maximum recycling and recovery of water and wastewater components should be the ultimate goal rather than zero pollutant discharge. In addition, all planning efforts should be consolidated under one section of the Act to insure continuity in all programs and additional funding of the Title II (construction grant) programs must be authorized and appropriated by Congress.

Pollution control abatement programs for nonpoint sources are still in the early developmental stages in Nebraska. To insure that progress is made in establishing and implementing these programs, the Department of Environmental Control recognizes a need for further study in all aspects of nonpoint source pollution control. The Section 208 Water Quality Planning Process will continue to be giving nonpoint pollution sources the attention they deserve.

State of New Hampshire

Complete copies of the State of New Hampshire 305(b) Report can be obtained from the State agency listed below:

Water Supply and Pollution Control Commission
105 Loudon Road
Prescott Park
Concord, NH 03301

B-77

Introduction and Summary

Authority

This report is an assessment of the water pollution control program of the State of New Hampshire, as of April 1, 1977. It is prepared in response to Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), hereinafter referred to as the Act.

Objectives

The objectives of this report are:

1. To present the existing water quality of the main streams and lakes of the State based on the latest data available (Figure 1, Table 1).
2. To compare the existing quality with the desired quality as stated in the legislatively-mandated stream classification (Figure 2, Table 1).
3. To outline the current and projected water uses relative to 1983 goals (Figure 3, Table 1).
4. To form a baseline for evaluation of future progress toward reaching the desired goal of achieving water in New Hampshire "which provides for the protection of fish, shellfish, and wildlife and provides for recreation in and on the water."* This goal will hereinafter be loosely referred to as "fishable and swimmable".
5. To present approximate costs required to achieve these future intended uses.
6. To address the State's nonpoint source control strategy.

*Quoted from Section 101(a) (2) of the Act.

TABLE 1
STATE OF NEW HAMPSHIRE 305(b) WATER QUALITY INVENTORY SUMMARY

River basin or coastal drainage (including main-stem and major tributaries	Total miles assessed	Miles *now* meeting Class B (fishable/swimmable) standards or better	Miles expected to meet Class B or better by 1983	Miles *now* meeting State WQ standards	Miles *not* meeting State WQ standards	Water quality problems**	Point source causes of WQ problems D=Domestic I=Industrial CS=Combined sewer	Nonpoint source causes of WQ problems 1=Major 2=Minor
Androscoggin	64.7	42.1	50.4	42.1	22.6	2,5,6	D,I,CS	2
Connecticut	470.3	103.6	451.8	103.6	366.7	2,5,6	D,I,CS	2
Merrimack	488.3	261.7	462.6	266.6	221.7	2,5,6	D,I,CS	2
Discataqua and coastal	180.5	89.7	180.5	89.7	90.8	2,5,6	D,I,CS	2
Saco	94.0	94.0	94.0	94.0	0	—	—	2
Total	1,297.8*	591.1	1,239.3	596.0	701.8			
% of total assessed	100	45.5	95.5	45.9	54.1			

*Represents 8.9% of 14,544 miles of identified streams in New Hampshire.

**Column 7-*Water Quality Problems:* 1. Harmful substances; 2. Physical modification (suspended solids, temperature, etc.); 3. Eutrophication potential; 4. Salinity, acidity, alkalinity; 5. Oxygen depletion; 6. Health hazerds (coliform).

Present and Future Water Quality

As a result of the water quality problems listed in the report, the present quality of many of the larger surface waters are below desired levels. Figure 1 delineates the approximate present or existing quality of the rivers of New Hampshire. Figure 2 indicates the legal classification of surface waters and represents the desired water quality of the rivers in New Hampshire. The uses assigned to each class are outlined in Table II A, Page 15 of the report. Note that over 99 percent of the rivers of New Hampshire are required by State statutes to meet the goals of "fishable", or "swimmable" waters intended in the Act. Several segments on principal rivers are presently degraded to less than C quality. The causes of point source degradation are known and the necessary abatement measures are given high priority so that the goals of the Act will be attained.

Abatement Measures

All known significant point sources of pollution have been issued National Pollutant Discharge Elimination System (NPDES) permits. These permits indicate the necessary abatement measures to be taken to meet the required water quality goals of both the State and Federal governments. Continued emphasis is on construction of municipal and industrial water pollution control facilities. Major emphasis is also placed on the subdivision and subsurface systems programs. This program involves review and approval of systems to protect the surface waters and groundwater of the State.

Lakes

Most lakes of New Hampshire are "B" quality or better and are "fishable-swimmable". At present there are 23 lakes of twenty acres or more that are classified as eutrophic. In the future there is to be no discharge of any point sources of nutrients into the lakes of New Hampshire. Where possible, nonpoint sources will also be controlled by appropriate preventive measures.

Nonpoint Source

Within the State, identified nonpoint source problems relate to:

- Agriculture practices (pesticides, nutrients);
- Silviculture practices (erosion, nutrients);

FIGURE 1
WATER QUALITY INVENTORY

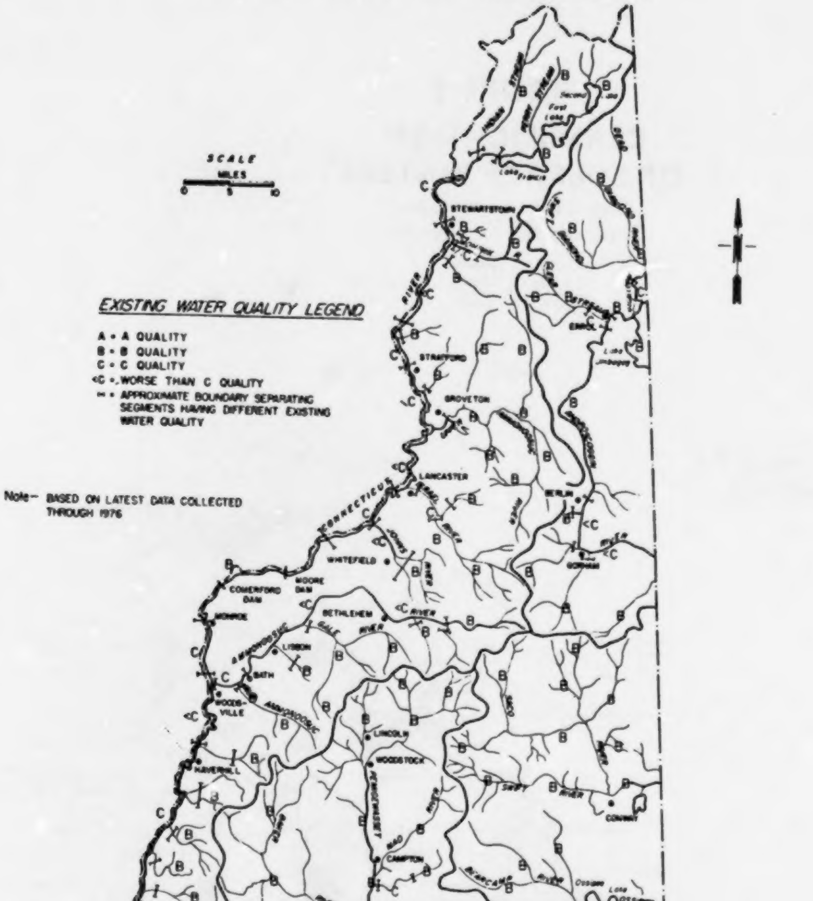
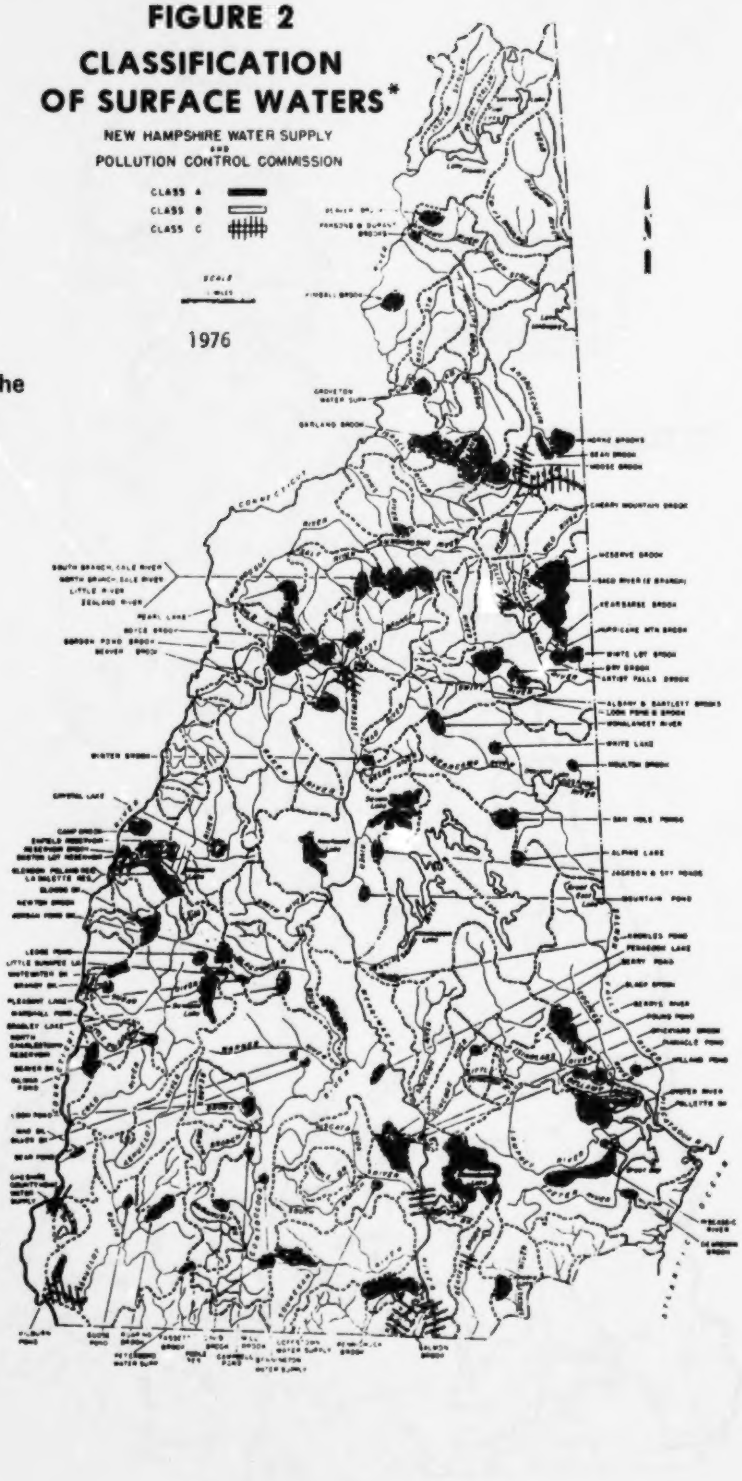

SCALE
MILES
0 5 10
EXISTING WATER QUALITY LEGEND
A = A QUALITY
B = B QUALITY
C = C QUALITY
<C = WORSE THAN C QUALITY
⊢ = APPROXIMATE BOUNDARY SEPARATING SEGMENTS HAVING DIFFERENT EXISTING WATER QUALITY
Note— BASED ON LATEST DATA COLLECTED THROUGH 1976
STEWARTSTOWN
STRATFORD
GROVETON
ERROL
LANCASTER
BERLIN
GORHAM
WHITEFIELD
COMERFORD DAM
MOORE DAM
MONROE
BETHLEHEM
LISBON
BATH
WOODSVILLE
LINCOLN
WOODSTOCK
HAVERHILL
CONWAY
CAMPTON
PLYMOUTH
ASHLAND
HANOVER
CANAAN
LEBANON
MASCOMA
CTR OSSIPEE
MEREDITH
WOLFEBORO
LACONIA
ALTON
MILTON
CLAREMONT
SULLIVAN COUNTY HOME
FARMINGTON
PITTSFIELD
ROCHESTER
DOVER
PENACOOK
BRADFORD
CHARLESTOWN
ALSTEAD
CONCORD
DURHAM
HILLSBORO
NEW BOSTON
MANCHESTER
EPPING
EXETER
KEENE
TROY
JAFFREY
MILFORD
DERRY
SALEM
HINSDALE
NASHUA
CONNECTICUT RIVER

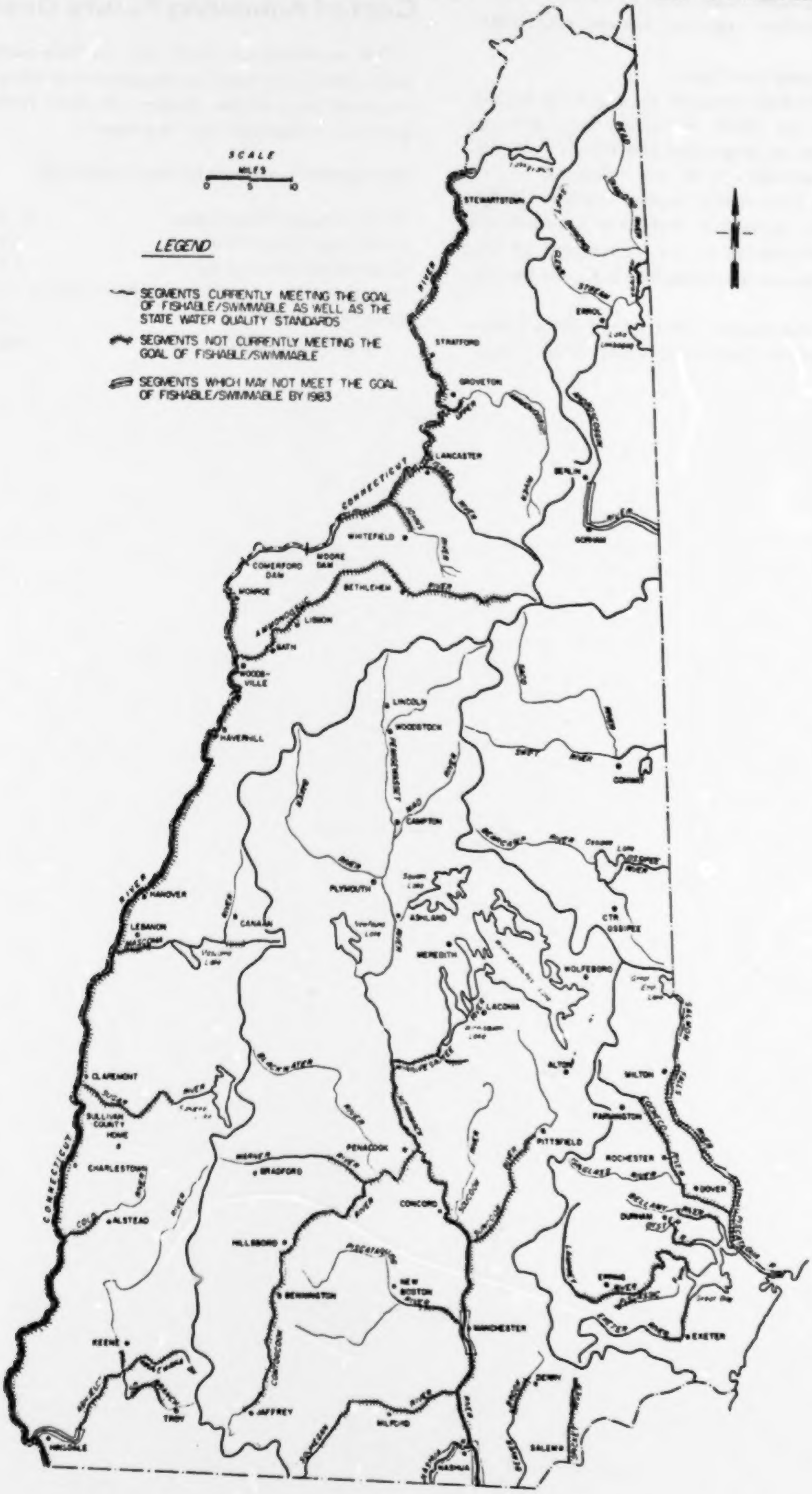
FIGURE 2
CLASSIFICATION OF SURFACE WATERS*

NEW HAMPSHIRE WATER SUPPLY
AND
POLLUTION CONTROL COMMISSION


CLASS A
CLASS B
CLASS C
SCALE
MILES
PARSONS & SUNSET BROOKS
KIMBALL BROOK
GROVETON WATER SUPP.
GARLAND BROOK
CONNECTICUT
HORNE BROOKS
BEAN BROOK
MOOSE BROOK
CHERRY MOUNTAIN BROOK
SOUTH BRANCH, GALE RIVER
NORTH BRANCH, GALE RIVER
LITTLE RIVER
ZEALAND RIVER
PEARL LAKE
BOYCE BROOK
GORDON POND BROOK
BEAVER BROOK
RESERVE BROOK
SACO RIVER (E BRANCH)
KEARSARGE BROOK
HURRICANE MTN BROOK
WHITE LOT BROOK
DRY BROOK
ARTIST FALLS BROOK
ALBANY & BARTLETT BROOKS
LOON POND & BROOK
WONALANCET RIVER
WHITE LAKE
MOULTON BROOK
WINTER BROOK
CRYSTAL LAKE
CAMP BROOK
ENFIELD RESERVOIR
RESERVOIR BROOK
BOSTON LOT RESERVOIR
LA SALETTE RES.
NEWTON BROOK
LEDGE POND
LITTLE SUNAPEE LA.
WHITEWATER BR.
PLEASANT LAKE
BRADLEY LAKE
NORTH CHARLESTOWN RESERVOIR
BEAVER BR.
LOON POND
BEAR POND
CHESHIRE COUNTY HOME WATER SUPPLY
ALPINE LAKE
JACKSON & SKY PONDS
MOUNTAIN POND
KNOWLES POND
PENACOOK LAKE
BERRY POND
BERRYS RIVER
ROUND POND
WILLAND POND
OYSTER RIVER
PISCASSIC RIVER
DEARBORN BROOK
ATLANTIC OCEAN
PETERBORO WATER SUPP.
CAMPBELL POND
LEFFERSON WATER SUPPLY
SALMON BROOK
1976

* By act of the legislature

FIGURE 3
WATER QUALITY INVENTORY OF SELECTED STREAMS


SCALE
MILES
0
5
10
LEGEND
SEGMENTS CURRENTLY MEETING THE GOAL OF FISHABLE/SWIMMABLE AS WELL AS THE STATE WATER QUALITY STANDARDS
SEGMENTS NOT CURRENTLY MEETING THE GOAL OF FISHABLE/SWIMMABLE
SEGMENTS WHICH MAY NOT MEET THE GOAL OF FISHABLE/SWIMMABLE BY 1983
STEWARTSTOWN
CLEAR STREAM
ERROL
Lake Umbagog
STRATFORD
GROVETON
ANDROSCOGGIN
LANCASTER
BERLIN
CONNECTICUT
RIVER
GORHAM
WHITEFIELD
COMERFORD DAM
MOORE DAM
MONROE
BETHLEHEM
AMMONOOSUC
LISBON
BATH
WOODSVILLE
SACO
RIVER
HAVERHILL
LINCOLN
WOODSTOCK
PEMIGEWASSET
MAD
RIVER
SWIFT
RIVER
CONWAY
BAKER
CAMPTON
BEARCAMP
RIVER
Ossipee Lake
OSSIPEE RIVER
RIVER
PLYMOUTH
Squam Lake
HANOVER
CANAAN
ASHLAND
CTR OSSIPEE
LEBANON
MASCOMA
Mascoma Lake
Newfound Lake
MEREDITH
Winnipesaukee Lake
WOLFEBORO
LACONIA
Winnisquam Lake
SALMON FALLS
BLACKWATER
WINNIPESAUKEE
ALTON
MILTON
CLAREMONT
SUGAR
RIVER
FARMINGTON
SULLIVAN COUNTY HOME
PENACOOK
PITTSFIELD
COCHECO
WARNER
RIVER
ROCHESTER
CHARLESTOWN
BRADFORD
ISINGLASS
RIVER
DOVER
CONCORD
SOUCOOK
SUNCOOK
BELLAMY
RIVER
DURHAM
OYSTER
COLD
ALSTEAD
HILLSBORO
PISCATAQUOG
NEW BOSTON
RIVER
LAMPREY
EPPING
Great Bay
BENNINGTON
MANCHESTER
EXETER
RIVER
EXETER
KEENE
ASHUELOT
CONTOOCOOK
DERRY
SPICKET
TROY
JAFFREY
MILFORD
SOUHEGAN
HINSDALE
NASHUA
SALEM

- Mining activities (sediment, pH, metals);
- Urban runoff (bacteria, nutrients);
- Construction activities (sediment);
- Individual subsurface disposal system (nutrients, leachate); and,
- Solid waste disposal (leachate).

At present no formal nonpoint source control program exists within the State. However, State statutes do regulate silviculture, pesticides and erosion control. The magnitude and severity of the nonpoint source problem is being investigated under Section 208(b) [F-K]. Planning for control of nonpoint sources will, therefore, be forthcoming at the conclusion of this investigation and be incorporated into a future Section 305(b) report.

For additional information, refer to the State's Nonpoint Source Pollution Control Strategy, Staff Report No. 71. Also refer to Appendix A, 1976 National Water Quality Inventory Report to Congress.

Cost of Achieving Future Goals

The approximate costs for publicly-owned wastewater treatment facilities required to achieve the future intended uses of the streams of New Hampshire are outlined in Appendix B of this report.

The summary of costs by river basins are:

Androscoggin River Basin	$ 37,833,000
Merrimack River Basin	578,284,000
Connecticut River Basin	112,402,000
Piscataqua River and Coastal N.H. Basins	131,982,000
Saco River Basin	21,493,000
Total for the State	$881,994,000

State of New Jersey

Complete copies of the State of New Jersey 305(b) Report can be obtained from the State agency listed below:

New Jersey Department of Environmental
Protection
P.O. Box 1390
Trenton, N.J. 08625

Summary

Table I provides an overview of the various water quality trends for stream segments throughout the State. Each symbol represents the combined data from several points on each stream. The overall trend for each quality parameter was assigned by averaging the trends for the individual stations. Trends indentified in Table I therefore represent trends which exist at more than one-half of the monitoring sites on each stream. Violations of the criteria are not averaged. A segment will appear as violating a criterion if the criterion is exceeded at any site within the segment.

Although the table presents generalized water quality information, it provides the following information:

- The parameters which are violated most frequently;
- Identification of those segments with numerous criteria violations; and,
- An average of water quality trends throughout the State.

TABLE 1
STATEWIDE WATER QUALITY TRENDS FOR NEW JERSEY'S SURFACE WATERS

River segment	Drainage Area (sq. mi.)	Fecal coliform	Dissolved oxygen	Biochemical oxygen demand	Suspended solids	Total dissolved solids	Phosphorus	Nitrate	pH
Wallkill River	210.1	↓▲	↑	↓	↑	–	↑▲	⊘	○
Flatbrook River	65.7	○	○	↑	–	○	–	–	
Paulinskill River	177.4	○	○	–	–	–	⊘	–	
Musconetcong River	157.6	+	+	○	–	–	+	–	–
Peguest River	158.7	+	↑		+	–	+	–	
Delaware River Tributaries in Runterdon County	116.9	+	–	–	–	–	⊘	–	–
Assunpink Creek	89.6	+	↓▲	○	○	–	↑▲	○	
Doctors Creek	26.7	–	↓	+	–	–	+	–	+
Crosswicks Creek	139.2	+	+	○	+	–	○	+	○
Assicunk Creek	45.3	+	–	+	–		⊘	–	
Rancocas Creek N.B.	167.0	+	+	–	–	–	+	–	○
Rancocas Creek, Mainstem	346.0	+	+	↑	↑▲	–	+	+	–
Rancocas Creek, S.W.B.	78.0	+	+	↑	+	○	+	–	↑
Pennsauken Creek	35.4	↓▲	+	↓▲	○	–	⊘	↑▲	○
Cooper River	42.0	+	+	↑▲	↑▲	–	⊘	+	○
Newton Creek		↓▲		↓▲	↑▲		+	↑▲	↑
Big Timber Creek	59.3	–	↑▲	○	↑▲		↓▲	+	
Mantua Creek	51.2	+	○	+	○	–	+	○	
Raccoon Creek	32.2	+	↓	↑▲	○	–	+	○	
Oldmans Creek	44.4	–	–	↓	○	–	○	○	○
Salem River	113.6	+	+	+	+	–	+	+	
Alloway Creek	62.1	+	+	–	+	–	+	+	
Cohansey River	105.4	↓▲	○	+	○	–	↑▲	○	↑
Maurice River	386.4	↓▲	↑	↑▲	↓	–	○	○	↑
Cedar Creek		○	↑		↑▲			–	○
Tuckerhoe River	102.0	+	○	○	–	⊘	–	–	
Tuckerton Creek	11.9	⊘	↑	↑▲	↑▲	⊘	↑▲	↓	↑
Mill Creek	19.7	↓	↓			⊘			
Oyster Creek	74.0	○	○	↑	↑▲	⊘	↑▲	○	↓
Forked River, N.B.	142.0	↑▲	↑▲	↑▲	↑▲	⊘	↑▲	↑	○
Great Egg Harbor River	338.0	+	↓▲	↑▲	○	–	⊘	+	
Pine Barrens	2,000.0			↑▲		○	↑▲	↑▲	
Toms River	191.0	↓▲	↑	↓	↓		⊘	⊘	○
Metedeconk River, S.B.	35.0			↑▲	↑▲		↓▲	⊘	
Metedeconk River, N.B.	31.0	↓▲	↑▲	↓	↓		↓▲	⊘	○
Manasquan River	80.0		⊘	○				+	○
Shark River	16.9		+	–				+	–
Raritan River, S.B.	276.5	↓▲	↑▲	⊘	↑▲	⊘	↓▲	↓	↓▲
Raritan River, N.B.	190.0	⊘	–	⊘	↑▲		↓▲	⊘	⊘
Raritan River, Mainstem	1,105.3	↓▲	↑▲	↑▲	↑▲	↓	↓▲	↑▲	–
Millstone River	283.0	↓▲	↓▲	↑▲	↑▲		↓▲		↑▲
Stony Brook			↑	↓	↑▲	⊘	↓▲	↑▲	↑▲
Lawrence Brook	4.5	↓▲	+	↑▲	↑▲	○	+	↑	↑
South River	132.8	↓▲	↑	↑▲	↓	○	↑▲	+	↑

Passaic River Freshwater	772.9	↓▲	↓▲	↑▲	↑▲	○	↓▲	⦸	○
Whippany River	71.1	↑▲	↑▲	↓▲	↑▲	↓	↓▲	↓▲	○
Rockaway River	137.2	↓▲	↑▲	⦸	–	↓	↓▲	⦸	○
Ramapo River	48.0	↓	↑	○	↓	○	↓▲	↓	↑▲
Pequannock River	90.0	○	↑	○	↑	⦸	↑▲	↓	↑
Wanaque River	84.0	↓▲	○	○	↓	–	↑▲	↑▲	↑▲
Passaic River, Tidal		↓▲	⦸	↓	↓▲	–	+	↓	↑
Peckmans River		↓▲	⦸	↓▲	↑▲		↓▲	↓▲	↑▲
Hackensack River	202.0			↑▲	↑▲		⦸	⦸	

KEY TO SYMBOLS

↑ better than the criterion and improving
↓ better than the criterion and degrading
↑▲ worse than the criterion and improving
↓▲ worse than the criterion and degrading
+ worse than the criterion, insufficient data for determining trend
– better than the criterion, insufficient data for determining trend
○ better than the criterion, and stable
⦸ worse than the criterion, and stable
blank = insufficient data.

State of New Mexico

Complete copies of the State of New Mexico 305(b) Report can be obtained from the State agency listed below:

Water Quality Section
Environmental Improvement Agency
P.O. Box 2348
Santa Fe, NM 87501

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Introduction

The goals and objectives for water quality management adopted by the New Mexico Water Quality Control Commission in 1976 are unchanged. While significant progress has been achieved in several portions of the State's water quality management program, water quality management is a long-term function which does not generally result in immediate drastic or dramatic changes in water quality. Comprehensive statewide ground water regulations have been adopted and a two-year statewide nonpoint source planning program is underway.

Status of Water Quality and Water Quality Programs—May 1976 to May 1977

Water Quality

Stream Quality

Studies were completed to determine the rate of recovery of a twelve-mile reach of the Cimarron River damaged by a diesel fuel spill. The spill occurred in October 1972 when approximately 7,000 gallons of diesel fuel flowed into the river following a truck accident. Sampling after the spill showed a 60 to 100 percent fish loss and decimation of aquatic invertebrate populations. The study conducted by the Game and Fish Department, with assistance from the Environmental Improvement Agency, indicated that invertebrate populations showed near recovery after one year and that brown trout increased to about 54 percent of prespill numbers within three years.

Reservoir Quality

Intensive sampling of Elephant Butte and Cochiti Reservoirs is continuing. In the second summer following establishment of the Cochiti Reservoir permament pool (1976), massive blooms of blue-green filamentous algae were observed. It remains to be seen whether this characteristic is attributable to initial leaching of nutrients from inundated land or whether it will be a persistent problem. Algal assay and chemical studies indicated that the Cochiti system remained primarily limited by phosphorous.

At Elephant Butte Reservoir, relatively low algal biomass and nutrient levels were found in the lower pool throughout 1976. Field studies to obtain the physical data necessary to apply nutrient loading models to Elephant Butte are continuing.

Standards and Regulations Development

Stream Standards

Revised stream standards were adopted on February 8, 1977, including additional numerical standards for total residual chlorine, ammonia and nitrate nitrogen for many high quality mountain streams. These standards were adopted following a statewide sampling program and a public hearing in October, 1976 and are consistent with the Commission's water quality management goal to: . . ."maintain and improve the quality of existing surface waters such as mountain streams . . . which are still capable of supporting natural life support systems."

Ground Water Regulations

The nation's first set of comprehensive statewide ground water regulations was adopted on January 14, 1977, and became effective February 18, 1977. The regulations are designed to protect ground water for domestic and irrigation use by establishing ground water quality standards and a system which controls discharges to the subsurface. They are the result of a three year process which included several public hearings as well as technical advisory committee meetings involving State agency staff and representatives of groups affected by the regulations. Sources to be controlled under these regulations include animal confinement and domestic wastewater disposal lagoons, tailings ponds, injection wells and land application of wastewaters. Specifically exempted is irrigated agriculture pending better knowledge of the problem and its possible solutions. The regulations require submission and approval of discharge plans and monitoring of ground water quality as appropriate. Although the regulations are currently being appealed by members of the uranium and power generation industries, New Mexico has significantly progressed towards one of its water quality management goals: "To protect the quality of all ground water which has a natural concentration of 10,000 mg/l or less total dissolved solids for present or future use as domestic and agricultural water supply."

Enforcement

Permit Adjudication

The NPDES permit program administered by the U.S. Environmental Protection Agency is the principal regulatory tool to protect the quality of New Mexico's surface waters. The State's Water Quality Control Commission regulations provide that State regulations to protect surface waters will not apply until Federal procedures have been exhausted. The EPA enforces permit conditions, with the exception of those subject to adjudication, which are "stayed". The EPA's authority to require permits has been challenged and adjudication has been requested by a majority of the largest mining and milling dischargers in the State for whom permits have been issued, including all but one of the uranium companies and the largest copper producer in the State. A lengthy adjudicatory process is anticipated which must be completed before the permit conditions will be enforceable against those major dischargers.

Ground Water Regulation Appeal

The regulations to protect ground water quality adopted by the Water Quality Control Commission in January, 1977 have been appealed by nine uranium companies and six power generation companies. The regulations are now in effect, but the extent to which the regulations can be enforced against those companies appealing is not clear. The scope of the appeal and the time involved in resolving it are unknown at this point.

Special Studies

Nonpoint Source Planning

A statewide water quality planning program has been initiated under Section 208 of the Federal Water Pollution Control Act, Amendments of 1972. The focus of the two-year program in New Mexico is on nonpoint sources of water pollution. Major studies being carried out under this program include: A statewide assessment of sediment-producing sources; an evaluation of silviculturally-related nonpoint sources; investigations of the presence and biomagnification of toxic substances in food chains along the Rio Grande; the impacts of irrigated argiculture on surface water quality along the Rio Grande and the nitrogen and phosphorous cycles in the Rio Grande; a regional evaluation of the cumulative effects of uranium industry activities on water quality in the Grants Mineral Belt; and the collection and evaluation of existing ground water quality data statewide using a computerized data base. The final form of the plan will be determined by the water quality problems identified.

State of New York

Complete copies of the State of New York 305(b) Report can be obtained from the State agency listed below:

Division of Pure Waters
New York State Department of
Environmental Conservation
Albany, NY 12301

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B-91

Summary

Water quality, in general, continues to improve, as evidenced by trends in traditional parameters usually associated with organic oxygen-consuming wastes, infectious agents, nutrients, and sediment/mineral pollution. These improvements are most evident during summer and fall low stream flow periods and are therefor indicative of the effectiveness of point source controls.

Major water quality problems, currently, are associated with toxic substances, combined sewer overflows, urban runoff, nutrient enrichment, and oil and hazardous substance spills, with lesser problems in the categories of sediment/mineral pollution. These problems can generally be associated with the higher ranges of stream flow and are, conversely, more indicative of nonpoint source activities. Toxic substances and nutrients can also be attributed to point sources.

Table I presents a statewide summary of basin water quality problems/priorities as a function of seven traditional categories of pollution. Priorities are indicated in the table as H-high, M-medium, L-low, and represent a subjective basin wide assessment. The significance of these seven major pollutant categories is also presented in terms of related water quality impacts, water use impairment and associated contributing factors.

Resources deployment during FY 77-78 will continue to emphasize the following: The massive municipal treatment facilities program now underway; identification, track-down and control of toxic substances; tightening up of N/SPDES permit enforcement; preventing, controlling and containing oil and hazardous substances spills; completing and coordinating water quality management programs; and, appropriate review and modification, where warranted, of water quality criteria and/or use classifications.

These priorities and deployments are necessarily subject to the uncertainty of availability of Federal and State funding and may be constrained commeasureately.

TABLE 1
SUMMARY OF BASIN WATER QUALITY PROBLEMS/PRIORITIES BY MAJOR POLLUTION CATEGORIES*

Major basin	Organic O_2 demand	Infection agents	Nutrients	Toxics	Thermal	Sed/mineral	Oil/hazardous spills
Lake Erie/Niagara	M	H	H	H	L	L	M
Allegheny River	M	L	H	M	L	M	H
Lake Ontario/minor tributaries	L	L	H	L	M	M	M
Genesee River	H	H	H	M	M	H	M
Chemung River	H	H	L	L	M	H	L
Susquehanna River	H	H	L	L	L	H	L
Seneca-Onieda-Oswego	H	H	H	M	L	M	M
Black River	M	M	L	L	L	M	L
St. Lawrence River	L	L	L	M	L	M	H
Lake Champlain	L	L	M	L	L	H	H
Upper Hudson River	H	M	M	H	L	L	L
Mohawk River	H	H	M	L	L	H	M
Lower Hudson River	H	H	M	H	H	M	H
Delaware River	M	M	H	L	L	H	L
Newark River-Raritan Bay	M	M	L	L	L	L	L
Housatonic River	L	M	L	L	L	L	L
Altantic Ocean/Long Island Sound	H	H	H	H	M	L	H

Significance of Major Pollutant Categories*

Concerns	Organic O_2 demand	Infection agents	Nutrient	Toxic	Thermal	Sediment/ mineral	Oil/hazardous substances
A. Water quality impacts	DO, BOD, COD, TOC,	Total Coli Fecal Coli Fecal Strep SPC	Nitrogen Phosphorus pH	Heavy metals Halo-organics N-Compounds Organo-DO$_4$	Temperature	Turbidity, Susp. solids	WQA Taste/odor
B. Water usage impairment	Fishing, Propagation, Bathing PWS	Bathing PWS (Pub. health)	Bathing PWS Esthetics	Public Health Fisheries, Agricultural	Fisheries	Fisheries, Bathing, Navigation, PWS	Essentially all uses
C. Contributing factors	Mun. point sources Ind. point sources On-lot disposal Urban storm runoff, CSO Animal feedlots Hydro. modifications Landfill Leachates	Min. point sources On-lot disposal Urban runoff CSO Agriculture NPS, animal feedlots Vessel wastes Sludge disposal	Ind. point sources Urban storm runoff, CSO Agriculture NPS Animal feedlots Sludge disposal	Ind. point sources CSO, urban runoff, in-place pollutants Sludge disposal	Ind. discharges Power (utility)	Ind. discharges Construction NPS Silv. NPS Mining NPS Agricultural NPS Salt water Intrusion	Mun. point sources Industrial discharges Urban runoff CSO Vessel wastes Sludge disposal Oil spills

State of North Carolina

Complete copies of the State of North Carolina 305(b) Report can be obtained from the State agency listed below:

Divison of Environmental Management
Department 1, of Natural and Economic Resources
Raleigh, NC 27611

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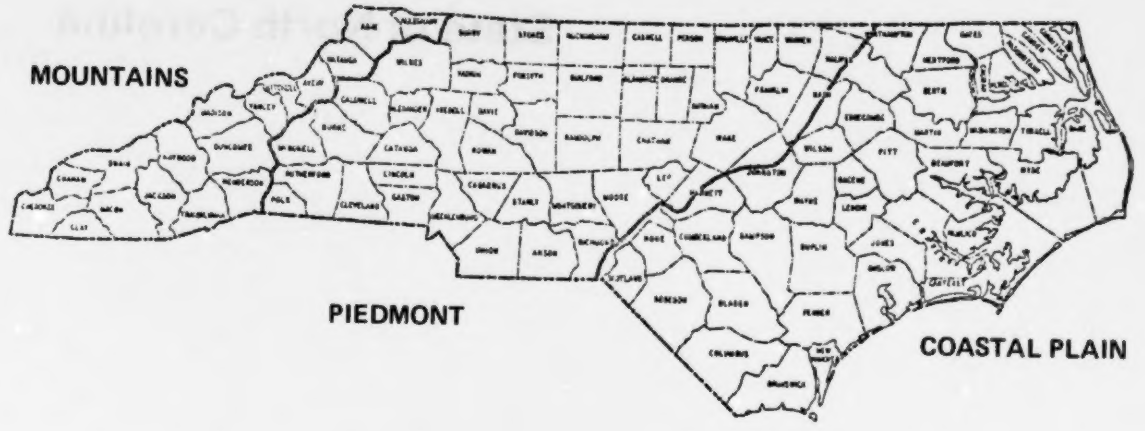
B-95



Summary

The State of North Carolina encompasses an area of 52,712 square miles of which 49,067 is land and 3,645 is inland waters. According to the 1970 census, the population of the State is estimated at 5,082,000. There are an estimated 40,000 miles of streams and 1,685 identified surface water dischargers within the State.

North Carolina is divided into three distinct regions, each of which has its own unique water resource benefits and problems. The Mountain region is characterized by its high mountain peaks (223 mountains have elevations greater than 5,000 feet), dense woodlands and relatively sparse population. The water quality in this region is good with the many spring-fed mountain streams providing high quality waters which support many excellent trout fisheries. While the cold turbulent waters of this region are capable of assimilating much larger quantities of oxygen consuming materials than the Piedmont and Coastal waters, protecting sensitive fish species such as mountain trout requires preventing even slight degradation of water quality.

The Piedmont region is characterized by much lower elevations and gently rolling hills. Since this region is the most populated and industrialized area of the State, a tremendous demand is placed on water resources. Not only does the Piedmont region contribute the heaviest waste load to the waters, but is also has the greatest demand for clean water for public and industrial consumption and for recreation. As would be expected, the majority of the State's water quality problems occur in this region.

The Coastal Plain region is characterized by generally flat terrain spanning from the higher elevations near the Piedmont to the low lying swamplands in the east to the sandy beaches of the coast. The water quality in this region is generally good except in areas of dense population. The waters in this region have higher temperatures and are slow moving and sluggish, thus they can assimilate much less oxygen demanding substances. Drainage from the swamplands often cause naturally occurring low oxygen levels, low pH, and high color and turbidity in streams in the area. Since the coastal waters receive the residues from the interior parts of the State, there is a potential for water quality problems, especially deposits of harmful substances and nutrient over-enrichment, in the bays and sounds inside the Outer Banks. Protecting fish and shellfish in the coastal waters is an important consideration in this region, since the harvesting of shellfish and commercial and sport fishing is a major commercial resource of the area.

State of Ohio

Complete copies of the State of Ohio 305(b) Report can be obtained from the State agency listed below:

Ohio Environmental Protection Agency
P.O. Box 118
Columbus, OH 43215

Summary

This document is the third annual water quality report prepared by the Ohio Environmental Protection Agency (Ohio EPA).

As requested by the United States Environmental Protection Agency, this report concentrates on information and data obtained in water year 1976 (October through September). Earlier data were only included where significant trends have been noted. For each water quality situation, a general sketch of the state of affairs in Ohio is presented.

In general, the comments given are developed from the data collected from each of the water quality monitoring stations. The sampling program from which data are obtained is described in Section 3 of the report, and a tabulation of the data collected in the Primary Water Quality Monitoring Network (PWQMN) is presented in Appendix I. PWQMN data and the individual basin reports are the principal sources of information for the body of this report. Summary reports on field biological investigations and the Ohio Lakes Program are included. Funds required for the State of Ohio to meet Federal Water Quality Goals are presented.

State of Oklahoma

Complete copies of the State of Oklahoma 305(b) Report can be obtained from the State agency listed below:

Department of Pollution Control
Box 53504
N.E. 10th & Stonewall
Oklahoma City, OK 73105

Introduction

This report was prepared from data generated by the Surface Water Quality Ambient Trend Monitoring Program conducted by the Oklahoma State Department of Health and the United States Geological Survey in cooperation with the Pollution Control Coordinating Board. This program consists of monthly monitoring of approximately 117 stream sites throughout the State.

Water quality has been assessed by evaluating data at the most distant upstream sites monitored on the Red River and the Arkansas River and determining downstream quality variations. Monitored tributaries to these two major drainages have been separately evaluated to indicate water quality and to identify influence on water quality variations in the Red and Arkansas Rivers.

This document includes first a general water quality statement for each stream monitored with each statement being subdivided into nutrients, minerals, and metals evaluations. Within each sub-division evaluation, violation of stream standards which may have occurred during WY 76 have been indicated. Each segment evaluation includes all mean data accumulated for that segment. This data summary immediately follows each water quality statement. The amount of raw data accumulated to prepare this report is too voluminous to be included as a part of this assessment. However, such data are available through the EPA's STOrage and RETrieval (STORET) computer system and may be retrieved by using Oklahoma State Department of Health (OSDH) monitoring site numbers included with each water quality statement on request to the OSDH, State Water Quality Laboratory.

Data Evaluation

In order to make any evaluation, it is first necessary to establish, either by general usage, by law, or by definition, the criteria against which judgements are made. The report used the following evaluation methods.

Stream Standards

Standards for chlorides, sulfates, total dissolved solids, pH range, minimum dissolved oxygen concentrations, cumulative relationship values (CRV) of toxic metals, and temperature maximums used herein are those established in *Oklahoma's Water Quality Standares, 1973*. For parameters not found in the Oklahoma Standards, standards established in *Water Quality Management Plans for Oklahoma, 1975* are used. Such violations are hereafter referred to as "exceeded maximum recommended limits."

Indices

- **Nutrient Index**

This index has been determined for this report for comparative purposes and is not intended to reflect any real number indicative of stream conditions, nor should it be construed to indicate nutrient loading in any stream segment. The index has been established by weighting of in-stream concentrations of chemical oxygen demand, total nitrogen, total phosphorus, dissolved oxygen, and pH measurements. The index number is, in effect, the ratio of observed to ideal water quality.

- **Mineral Index**

This index was determined for this report by utilizing dissolved solids data. Validity or actual calculation of such data relied upon concentrations of total alkalinity, chlorides, sulfates, total dissolved solids, and field measurements of specific conductance, depending upon which data were available for a particular stream segment.

Total Versus Dissolved Metals

All metals analyses performed determined total metals concentrations, in that samples were not filtered before preservation. Such determinations will reflect high metals concentrations during or after runoff events, or if any stream condition is conducive to particulate suspension. Marked fluctuations in raw data for metals are a reflection of this condition.

Variations from the Mean

In order to establish for a time period a representative value for any given parameter, it is necessary to delete from calculation of the annual mean any value which has significant variance from a median value. Mean data included in this report do not indicate deletion of these deviations, but concentrations used in calculating loadings and indices have been calculated on an annual mean basis with such deletions executed.

Chemical Oxygen Demand

In areas of Oklahoma which are very highly mineralized due to chlorides, COD concentrations are less meaningful in estimating nutrient levels of a stream due to chloride interferences with analytical determinations. Although mercuric sulfate is used to complex the chloride ion and mitigate its effect on analytical results, very high concentrations of chlorides in a sample reduce accuracy of the COD test considerably. This situation is evident in COD data for the Cimarron River and Salt Fork of the Arkansas drainages, and in the Salt Fork of the Red River drainage.

Maps

Two maps are included with this report which depict mineral and nutrient quality of stream segments in Oklahoma by color code.

Charts

A chart of nutrient and mineral loadings, flows, and mineral/nutrient index values are included for each stream segment in the Appendix of this report, (see "Variations from the Mean," above).

State of Oregon

Complete copies of the State of Oregon 305(b) Report can be obtained from the State agency listed below:

Oregon Department of Environmental Quality
1234 W. Morrison St.
Portland, OR 97205

B-101

Summary

In 1976, the Department of Environmental Quality revised its statewide water quality monitoring program pursuant to U.S. Environmental Protection Agency regulations and established a base network of 74 freshwater monitoring stations. This network consists of 9 primary and 65 secondary stations. Primary stations are located at critical points on major streams and are sampled monthly, every year to establish long-term trends in water quality. Secondary stations are located on smaller streams and large tributaries to parent rivers. These locations are sampled monthly for one year, every third year. This revised monitoring program provides a broader range of analyses on fewer samples and more frequent sampling at selected sites to establish both seasonal and long-term water quality trends.

The primary stations sampled in 1976 included three sites on the Willamette River and one each on the Deschutes, Umpqua, Rogue, Klamath, McKenzie, and Santiam Rivers. In addition, a total of 17 secondary stations were surveyed as follows: 8 in Rogue Basin, 3 in Grande Ronde Basin, 2 in Powder Basin, and one each in Umatilla, John Day, Malheur River and Owyhee Basins.

Water quality at each of the basins' monitoring points generally met the established instream standards in 1976. Some of the observed water quality aberations follow.

pH

The pH standard for each of the basins surveyed is 6.5 to 8.5 except for Malheur River, Owyhee, and Klamath Basins where the standard is 7.0 to 9.0. Some minor technical violations included values both above and below the established standards. Those below the standard most likely resulted from surface runoff during high flows, whereas those that exceeded the standard were related to the photosynthetic activity of algal blooms during seasonal low flows. Neither type of deviation is known to adversely affect aquatic organisms or the beneficial uses of water.

Dissolved Oxygen

All basins have a seasonal low flow dissolved oxygen standard of 90 percent of saturation, except in the Grande Ronde, John Day, Umatilla, Powder, Malheur River and Owyhee Basins where it is 75 percent of saturation. The middle and lower reaches of the Willamette and Klamath Rivers have dissolved oxygen standards expressed in mg/l. For salmonid spawning, hatching and rearing waters, the standard in each basin is 95 percent of saturation. Most of the basins' streams generally met the established standards for dissolved oxygen on a year-round basis in 1976, except for minor technical violations ranging from 1 to 4 percent below the standard. These deviations were probably due to analytical error or to natural water quality conditions. Slight deviations relative to the standards are not known to affect resident aquatic life or adversely limit the beneficial uses of water.

MPN Total Coliforms

Where bacterial standards have been established for streams or stream reaches, either 240 total coliform organisms per 100 ml or 1,000 total coliform organisms per 100 ml is the standard. Although a standard for fecal coliform concentrations has not been established, those organisms were sampled in conjunction with total coliforms for comparative purposes. The bacterial standards were met in most basins with several exceptions. In those stream reaches where the standards were not met, the following events probably occurred:

- Land wash runoff during seasonal high flows carried bacterial populations into the streams, thus causing a violation of the standard.
- Streams receiving irrigation return flows during the summer season usually yielded relatively high total coliform concentrations.
- It is the Department's intent to adopt a fecal coliform standard to replace the current total coliform standard when sufficient data has been collected and evaluated. Until such time, the Department will continue to use the established MPN total coliform standards.

In addition to the above parameters relative to water quality standards, several other parameters are influenced by seasonal variation in stream flows. The seasonal variations in flow cause higher temperatures during the summer low flow period. Land wash runoff during high flows generally causes high levels of suspended solids in the streams.

In general, high flows occur in basins located west of the Cascade Mountain Range during the months of November through May and in basins east of the Cascades during the spring. Those flows primarily correspond to rainfall and snowmelt runoff patterns in the western and eastern portions of the State, respectively.

For the basins surveyed in 1976, water quality aberations which occured on occasion were associated with seasonal flow patterns inherent in the basins. They are not known to have either stressed the aquatic life or limited the recognized beneficial uses of water. Currently, the least understood water quality parameter is the fluctuating coliform bacterial population, its various sources and its impact on recognized beneficial uses of water. Additional studies are needed before the Department can propose replacement of the total coliform standards with fecal coliform standards.

State of Pennsylvania

Complete copies of the State of Pennsylvania 305(b) Report can be obtained from the State agency listed below:

Pennsylvania Department of Environmental
Resources
Bureau of Water Quality Management
P.O. Box 2063
Harrisburg, PA 17120

Summary

Pollution Sources

Water pollution problems in Pennsylvania are attributable to a variety of sources. These are considered in two general categories, point and nonpoint sources.

Point sources are those such as sewage discharges, industrial waste discharges and storm or combined sewer drainage that are conveyed to a water body in a pipe or channel. Nonpoint sources include discharges of polluted ground water, storm water runoff, drainage from abandoned mines, and agricultural runoff. In addition to the point and nonpoint source pollutants, many of which are chronic in nature, acute problems are caused by the addition of substances in the State's waters through spills and accidents which are most often related to storage or transport of materials.

The State of Pennsylvania has a total area of approximately 45,333 square miles. Pollution problems vary with population concentration, type of industry or mineral resources in an area, and very often the geology and topography of an area. The nearly 12 million people who live and work in Pennsylvania are not uniformly distributed over the State and, therefore, the intensity of population-based pollution problems are not uniformly distributed.

In areas with heavy industrial and population concentrations, sewage and industrial wastes are the major pollution sources. Storm and combined sewer runoff add to the pollution problems. In western and parts of central Pennsylvania, drainage from bituminous coal mines (primarily abandoned mines) creates serious water quality problems. The same situation exists in the anthracite area of northeastern Pennsylvania. Approximately 2,000 miles of major streams in Pennsylvania are adversely affected by drainage from abandoned coal mines. Figure 1 shows the magnitude of the mine drainage problem in the State's major river basins.

Other pollution sources in Pennsylvania include oil well operations in northwestern Pennsylvania, construction and other earth-moving operations which have created serious erosion and sedimentation problems, and a significant number of power plants scattered throughout the State which discharge heat—also a potential pollutant.

A description of the State's water pollution control program can be found in the annual State strategy and program plan prepared by the Bureau of Water Quality Management and submitted to the U.S. Environmental Protection Agency.

Assessment of Water Quality

The success or effectiveness of Pennsylvania's water quality management program can best be measured by the improvement in quality of polluted or degraded water and by the adequacy of protection of good quality waters. From 1972 through 1976, there was a net increase of 669 miles of the State's streams showing improvement. In 1976, 136 miles of streams improved, while 47 miles were degraded for a net gain of 89 miles of streams improved during the year. These improvements were due to upgrading or eliminating waste discharges, mine drainage treatment and abatement activities, and changes in industrial operations. Approximately half of the stream degradation was caused by coal mining operations.

A tabulation of stream quality changes (improvement and degradation for the years 1972 through 1976) is summarized by major drainage basin below. A detailed tabulation can be found in Part I of the State report.

PENNSYLVANIA STREAM QUALITY
(1972-1976)

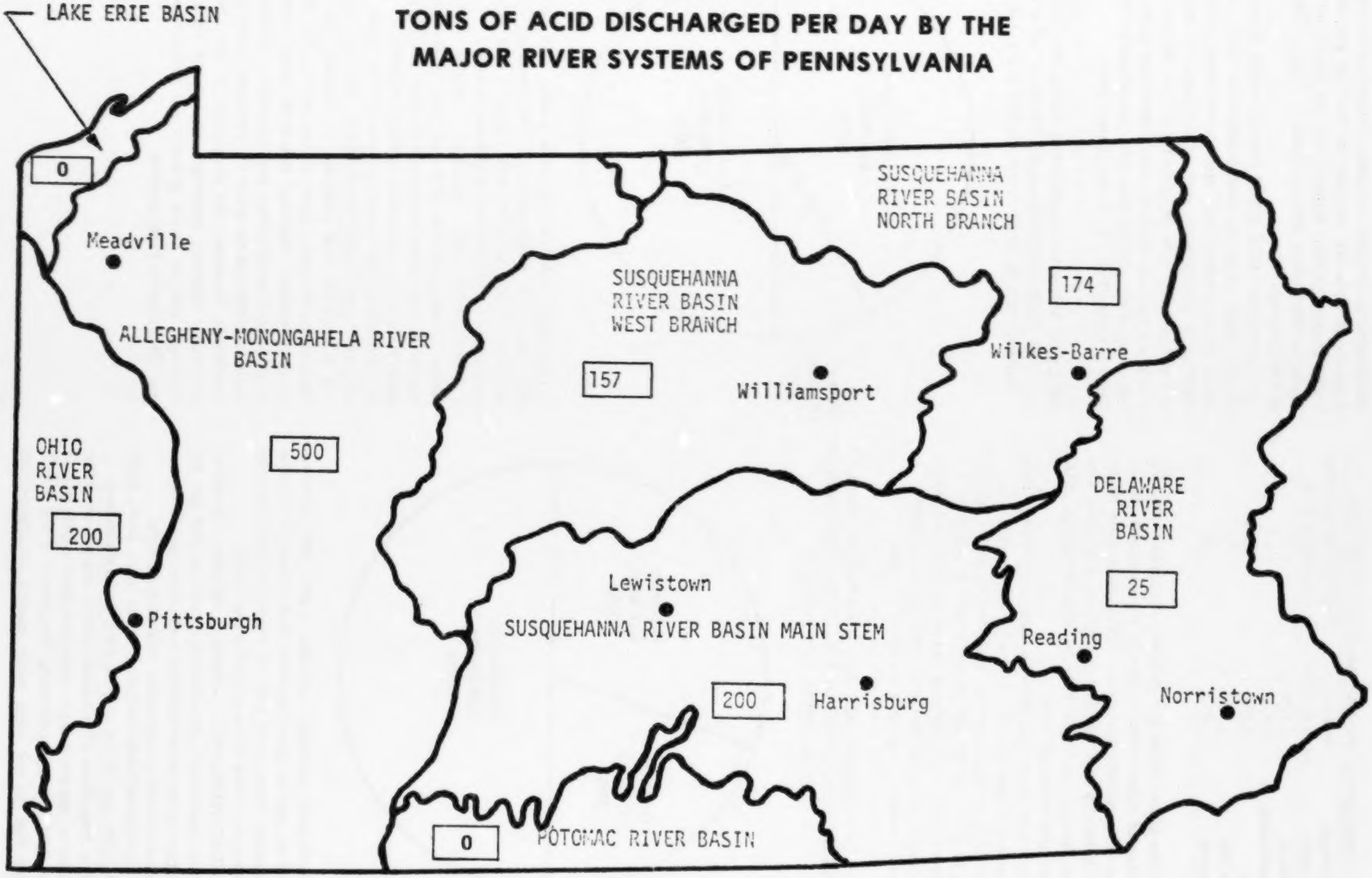
Drainage basin	Miles of stream improved	Miles of stream degraded	Net improvement
Delaware	85	2	83
Susquehanna	261	58	203
Ohio	430	77	353
Lake Erie	34	9	25
Potomac	5	0	5
Total	815	146	669

Water quality standards were established for Pennsylvania surface water between 1967 and 1973, and were designed to protect stream uses that would be possible if there was no pollution. Specific numerical criteria were assigned to protect these uses. The water quality standards are currently under review and revision as required by Section 303(e) of PL 92-500. This will ensure that State and Federal legal requirements are being met and that water quality criteria and indicator coverage are adequate to protect uses. Public hearings on these revisions will be held in 1977.

Water quality standards are in effect for all of the State's waters and are monitored routinely at 235 locations. We do not have monitoring stations or survey information on every stream. Part II of the State report includes a stream segment-by-segment evaluation of miles of major streams meeting water quality criteria and an identification of the major problems. Major problems are further defined as to the parameter group responsible for failure to meet water quality standards. We have also included in this year's report for the first time an assessment of the point and nonpoint impact for each problem area. If there are pollution problems, an indication of the progress toward correcting the problems is provided. These estimates are the best available at present.

Summarized below by drainage basin is a status report on compliance with water quality criteria. On an overall basis, approximately 80 percent of the State's major streams comply with water quality criteria. Major streams are those with stream quality monitoring stations and those described in the 1917 *Pennsylvania Gazetteer of Streams.*

FIGURE 1
TONS OF ACID DISCHARGED PER DAY BY THE MAJOR RIVER SYSTEMS OF PENNSYLVANIA


LAKE ERIE BASIN
0
Meadville
ALLEGHENY-MONONGAHELA RIVER BASIN
500
OHIO RIVER BASIN
200
Pittsburgh
SUSQUEHANNA RIVER BASIN WEST BRANCH
157
Williamsport
SUSQUEHANNA RIVER BASIN NORTH BRANCH
174
Wilkes-Barre
DELAWARE RIVER BASIN
25
Reading
Norristown
Lewistown
SUSQUEHANNA RIVER BASIN MAIN STEM
200
Harrisburg
POTOMAC RIVER BASIN
0

COMPLIANCE WITH WATER QUALITY CRITERIA

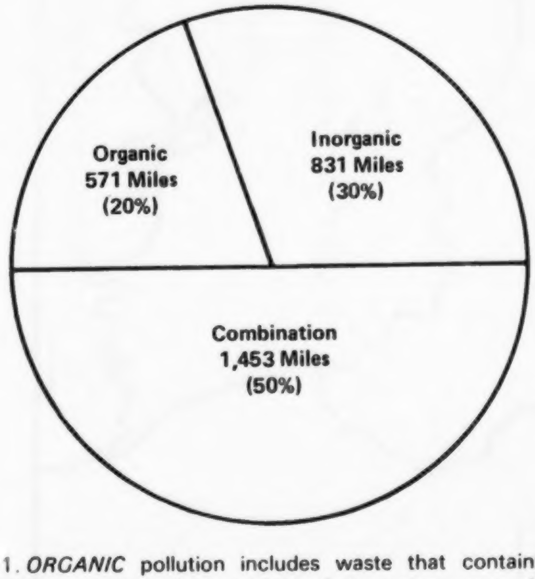
Drainage basin	Miles of major streams	Percent of stream miles meeting criteria
Delaware	2,370	77
Susquehanna	7,479	81
Ohio	3,796	73
Lake Erie	100	90
Potomac	418	98

At the present time, 2,855 miles, or approximately 20 percent of major stream miles in Pennsylvania, fail to meet water quality standards. Abandoned mine drainage, either by itself, or in combination with other pollution sources, is responsible for approximately 2,000 of the total miles degraded.

The chart below summarizes data presented in Part II, Table 2, Pages 122-124 of the State Report.

Bacteria criteria are not included in water quality assessments due to lack of good data. In addition, experience has shown that due to the uncontrolled nature of nonpoint runoff, bacteria criteria are exceeded in most streams during some portion of the year.

MILES OF STREAMS NOT MEETING WATER QUALITY STANDARDS AND TYPES OF POLLUTION RESPONSIBLE 1976—TOTAL 2,855 MILES

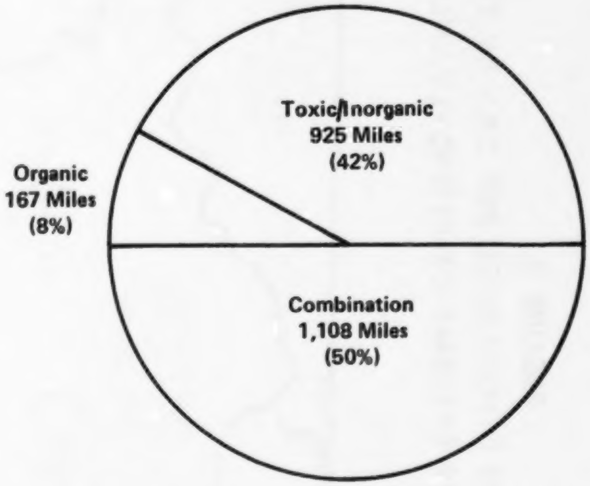


1. *ORGANIC* pollution includes waste that contains BOD as well as plant nutrients that create an organic response. These generally are municipal and industrial wastes and some farmland and urban runoff.
2. *TOXIC/INORGANIC* pollution includes industrial waste, abandoned mine drainage, and oil and gas extraction brines, some farmland and urban runoff, power generation and construction related pollutants.
3. *COMBINATION* includes areas that have both *ORGANIC* and *TOXIC/INORGANIC* pollution sources.

The magnitude of nonpoint source impact on water quality is apparent from compiled data which shows that 2,012, or approximately 70 percent of the 2,855 miles that do not meet water quality standards, are attributable to nonpoint pollution. These point/nonpoint degradation data are included for the first time in the 1977 Section 305(b) Report, and are based on best available information (Part II, Table 4, Pages 128-129 of the State report).

Projecting to 1983, 2,200 miles of major streams in Pennsylvania will fail to meet established water quality goals. Mine drainage from abandoned mines, either by itself or in combination with other pollution sources, will account for over 90 percent of the stream miles which are not expected to meet established goals. The following chart summarizes data presented in Part II, Table 3, Pages 125-127 of the State report.

MILES OF STREAMS WHICH ARE NOT EXPECTED TO MEET 1983 WATER QUALITY STANDARDS AND STREAM MILES AFFECTED—TOTAL 2,200 MILES



1. *ORGANIC* pollution includes waste that contains BOD as well as plant nutrients that create an organic response. These generally are municipal and industrial wastes and some farmland and urban runoff.
2. *TOXIC/INORGANIC* pollution includes industrial waste, abandoned mine drainage, and oil and gas extraction brines, some farmland and urban runoff, power generation and construction related pollutants.
3. *COMBINATION* includes areas that have both *ORGANIC* and *TOXIC/INORGANIC* pollution sources.

It is apparent that progress in attaining the 1983 "fishable-swimmable" goals as set forth in PL 92-500 is being realized. Improved industrial waste treatment facilities and construction and upgrading of municipal facilities continues to result in improved water quality conditions. However, the magnitude of the nonpoint pollutional sources, especially abandoned mine acid drainage, will no doubt prevent full achievement of the 1983 goals in Pennsylvania.

Water Pollution Control Expenditures

Progress in water pollution control is brought about by investments at the local, State and Federal levels. Everyone pays for water pollution control through taxes, sewer bills and the cost of products. The following table presents capital expenditure and pollution abatement needs that illustrate recent Federal and State government investments made in grants and abatement projects and some estimates of remaining needs. Cost figures were not available for the local share of municipal projects, but most of the grant funds for sewage treatment plant construction were made on a 75 percent Federal and 25 percent local basis. Cost data are not available for industrial investments at the present time. We expect to have improved estimates available in the future from the State's COWAMP program.

WATER POLLUTION CONTROL EXPENDITURES (1972-76) AND NEEDS (MILLIONS OF DOLLARS)

	State and Federal government expenditures	Estimated pollution abatement needs
Sewage collection and treatment	824	2,984
Abandoned mine drainage pollution and abatement	129	1,000
Industrial pollution abatement	No data available	No estimate available
Erosion and sediment control	1.5	No estimate available
Storm water management	No data available	3,917
Total	954.4	7,901

Chlorinated Hydrocarbon Monitoring Program

Pennsylvania monitoring and surveillance efforts were expanded in 1976 with the initiation of a Statewide monitoring program to determine levels of PCB and other persistent hydrocarbons in selected species of fish. The data indicated that PCBs are widespread throughout the Commonwealth, but in relatively low concentrations.

Supplemental Water Quality Reports

Summaries of Water Quality Inventory Reports for the Delaware, Ohio and Susquehanna Rivers as prepared by the Delaware River Basin Commission, Ohio River Valley Water Sanitation Commission and Susquehanna River Basin Commission are included in Appendix C of the State report.

Puerto Rico

Complete copies of the Puerto Rico 305(b) Report can be obtained from the State agency listed below:

Environmental Quality Board
1550 Ponce de Leon Avenue
Santurce, PR 00910

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Introduction

This report, like the report submitted last year, was prepared in compliance with Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

The main objective of this year's Section 305(b) report is to present an evaluation of water quality trends in Puerto Rico by using data gathered in monitoring stations throughout the island. Updated cost estimates involved in meeting the goals of the Act are also presented.

Summary

In order to define the changes in the water quality picture over the years, it was decided to limit the analysis to the data collected as part of the routine monitoring network of surface waters carried on by the U.S. Geological Survey, and of coastal waters by the Puerto Rico Environmental Quality Board.

General trends noted in the surface waters near the last three years indicate there have been some improvements in water quality with respect to dissolved oxygen. Concerning total and fecal coliforms there had been some increase in number in some stations. A trend analysis was made for 19 surface water stations that have five-year coliform data. Only 21 percent of the stations have a definite trend pattern. One station has a downward pattern, meaning improved water quality. Three stations show an upward trend, or an increase in the number of coliforms. From this it was concluded that a year-to-year change in water quality cannot be established as an improvement or deterioration.

It was found that the only new treatment plants that are operating are at Ciales and Naranjito, so that any improvement in water quality can only be attributed to abatement measures other than the construction grant program; probably the NPDES permit system had limited water pollution discharges.

The extent of the problem is still great, as can be seen from the fact that 32 of the 58 stations are still in contravention of the standard.

The general trends noted in the dissolved oxygen analysis for coastal water indicate that in almost all cases where dissolved oxygen data were considered improved in last years report, had remained the same. Only two stations were found to have dissolved oxygen mean values lower than the standard. Increased fecal coliforms at two stations may be due to the fact that there were more sanitary discharges to the beach area and sampling was done during the time of discharges, or shortly afterwards.

In terms of existing water quality, it should be noted that there are still coastal waters in violation of applicable water quality standards. These violations, however, represent a small percentage of the total stations sampled.

The bacteriological survey done by The Environmental Quality Board in the Condado beach area proved that while there were some improvements in water quality, there is still a health hazard to those who would use the area. Last year's report indicated that the degraded quality of the waters in this area is due to the large percentage of illegal sanitary sewer connections to storm sewers. For this reason, the Condado Beach restoration task force was formed. Since no intensive study was done during the fiscal year reported, only the abatement actions done by this group were considered.

The current waterborne diseases situation in Puerto Rico is relatively unchanged from what was reported last year. All of Puerto Rico's surface waters must still be assumed to harbor *Schistosoma mansoni*, the parasite which causes the disease Schistosomiasis. During a recent survey of the prevalence of Bilharzia in the eastern part of Puerto Rico, a skin test performed on fifth grade school children by the Center for Energy and Environment Research in May, 1976, showed the high prevalence of this disease in this area. It was also reported that this disease is even more prevalent in areas which have no control programs for Bilharzia.

Water Quality Goals and Control Programs

The situation in Puerto Rico with respect to water quality goals is basically unchanged since last year's report. The basic problem is the parasitic disease Schistosomiasis. It is felt Puerto Rico can attain the goals of the Act, but whether these goals can be attained by 1983 is another story. It is felt that there will be a better overview in this regard after the July, 1977 milestone.

Costs and Benefits

Municipal needs were determined to be $1,033 million (1973 dollars) in the 1976 "Needs" survey. This is a revised cost that was presented in last year's report. In order to update this figure, the total cost estimate presented in the most recent priority list was tabulated to be $910 million. This represents the majority of projects scheduled for construction, but is not a complete list since there are certain projects for which no cost information has been compiled to date.

There is no information presently available concerning the cost involved with applying water quality management techniques to industrial or nonpoint sources of pollution.

The benefits to be derived by providing secondary treatment at regional plants employing long ocean outfalls are still in question. It seems clear that budgetary considerations will exercise a strong influence on future planning of treatment levels in Puerto Rico.

Nonpoint Sources of Pollution

While no new data have been generated, and very few observations have been carried out in this respect, it seems clear that the nonpoint source pollution situation in Puerto Rico has been changed very little since last year. The major nonpoint sources are attributed to rural populations discharging raw wastes to receiving waters, siltation runoff, pesticide contamination, and agricultural runoff.

State of Rhode Island

Complete copies of the State of Rhode Island 305(b) Report can be obtained from the State agency listed below:

Division of Water Pollution Control
Rhode Island Department of Health
State Office Building
Davis Street
Providence, RI 02908

B-111

Summary

Under Public Law 92-500, Section 305(b), the State is required to report each year to Congress through the Environmental Protection Agency (EPA) the progress being made toward meeting water quality goals. This report affords each State the opportunity to report to the people and Congress on progress and problems in achieving short-term and long-term (1983) goals set for the water pollution control program. It affords citizens and Congress an opportunity to see how funds are spent in achieving these goals and allows the public a chance to comment where program priorities should be assigned.

This report seeks to summarize: Existing water quality; the effect of point sources of discharge; waters which are expected to meet water quality criteria for 1977 and 1983, with an analysis of conditions possibly preventing this achievement; and, costs of achieving the objectives of PL 92-500.

In the discussion of water quality, the basin approach is taken, incorporating basins established for the Section 303(e) continuing planning process. The report is based on information contained in the water pollution control plans for the seven basins for Rhode Island—Blackstone, Moosup, Moshassuck, Narragansett Bay, Pawcatuck, Pawtuxet, and Woonasquatucket (Figure 1)—the 1975 Section 305(b) Report, the 1976 Needs Survey, and the 1976 Construction Grant Priority Report. Table 1 presents a summary by basin of the status of meeting water quality objectives. More detailed information can be found in reports listed in the reference section of the State report.

Rhode Island has a combined land and inland water area of 1,058 square miles. It has a salt water shoreline of 419 miles in length. While Rhode Island is the nation's second most densely populated State, 70 percent remains undeveloped. The goal of the State's Statewide Planning Program is to retain, through proper land use planning, an open space at 50 percent of the total land area through 1990.

Rhode Island's economic base has changed significantly from the time the textile industry replaced agriculture in the middle 19th century as the major industry. In recent years, jewelry and machine-tool manufacturing has replaced the textile industry as the major manufacturing industries. In 1971 it was estimated that non-manufacturing employment provided more than three-fifths of the jobs available. From 1965 to 1970, employment in manufacturing declined by 600 jobs, while employment in non-manufacturing service industries increased by 25,000 jobs.

Many rural communities have sought to increase their tax base by zoning rural areas for industrial use. Yet, a recent survey reported that one-quarter of all industrially-zoned sites in Rhode Island were characterized by unfavorable soil and topographical conditions. One-sixth of these sites lacked public water, three-fifths lacked public sewers, and two-thirds lacked rail service. It is our intent through the State land use plan and the issuance of State approvals for treated waste discharges to discourage or prohibit industrial growth in rural areas where public sewers are not available, especially where industries require large amounts of water and would consequently produce large volumes of waste for disposal. Recently-established industrial parks, provided with public water and sewerage, are still under-utilized.

TABLE 1
STATE OF RHODE ISLAND 305(b) WATER QUALITY INVENTORY SUMMARY—APRIL 1977

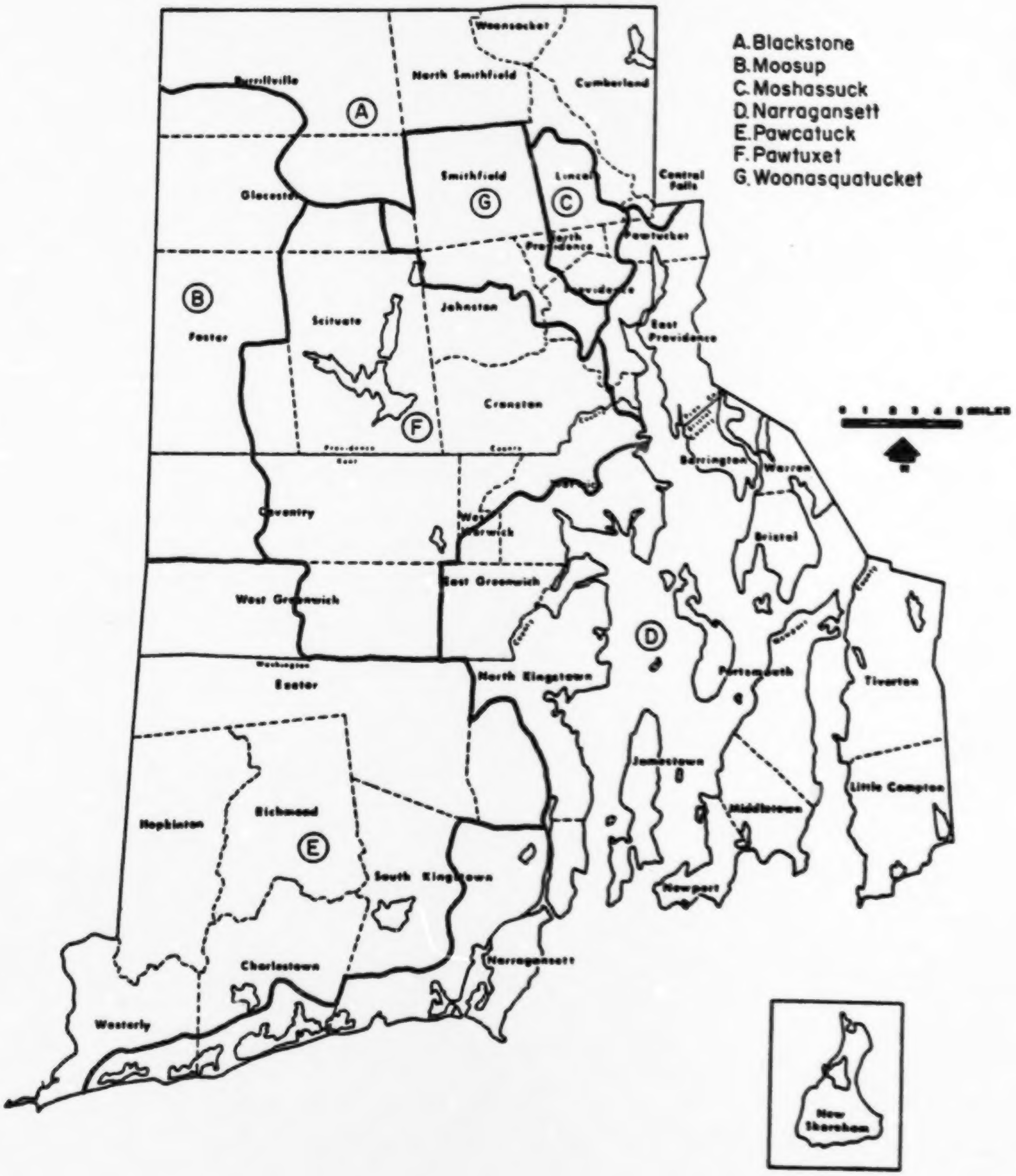
1	2	3	4	5	6	7	8	9
River basin or drainage (including main-stem and major tributaries)[a]	Total miles	Miles *now* meeting Class B (fishable/ swimmable) or better	Miles expected to meet Class B by *1983*	Miles *now* meeting State WQ standards	Miles *not* meeting State WQ standards	Water quality problems[*]	Point-source causes of WQ problems M=Municipal I=Industrial	Non-point source-caused problems 1=major 2=minor 3=N/A
Blackstone River	88.8	47.9	53.7	75.5	13.3	5,6	M,I	2
Moosup River	25.2	25.2	25.2	25.2	0	—	—	—
Moshassuck River	17.4	8.2	9.9	14.1	3.3	5,6	M	1
Narragansett Bay	117,764ac	107,959ac	112,832ac	107,959ac	9,805ac	6	M,I	1
Pawcatuck River	115.0	93.9	102.5	111.0	4.0	5,6	M,I	unknown
Pawtuxet River[b]	59.7	28.3	29.8	56.4	3.3	5,6	M,I	2
Woonasquatucket River	22.6	7.9	12.8	19.8	2.8	5,6	M	1
Total river miles	327.7	211.4	233.9	302.0	26.7			

[*] Column 7—*Water Quality Problems:* 1. Harmful substances; 2. Physical modification (suspended solids, temperature, etc.); 3. Eutrophication potential; 4. Salinity, acidity, alkalinity; 5. Oxygen depletion; 6. High coliform.

[a] Does not include Ten Mile River Basin, See Massachusetts River Basin Plan Reports.

[b] Pawtuxet River—Does not include Flat River Reservoir and tributaries thereto (Existing Class A and B).

FIGURE 1
RHODE ISLAND RIVER BASINS


A. Blackstone
B. Moosup
C. Moshassuck
D. Narragansett
E. Pawcatuck
F. Pawtuxet
G. Woonasquatucket
Woonsocket
North Smithfield
Cumberland
Burrillville
Glocester
Smithfield
Lincoln
Central Falls
Pawtucket
North Providence
Providence
Johnston
East Providence
Foster
Scituate
Cranston
Providence County
Kent County
Coventry
West Warwick
East Greenwich
West Greenwich
Barrington
Warren
Bristol
Washington
Exeter
North Kingstown
Portsmouth
Tiverton
Jamestown
Middletown
Little Compton
Newport
Hopkinton
Richmond
South Kingstown
Charlestown
Narragansett
Westerly
New Shoreham
MILES
A
B
C
D
E
F
G

State of South Carolina

Complete copies of the State of South Carolina 305(b) Report can be obtained from the State agency listed below:

Department of Health and Environmental Control
J. Marion Sims Building
1600 Bull St.
Columbia, SC 29201

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B-115

Summary

Current Water Quality

The conditions of the waters of the State of South Carolina were reviewed using a combination of biological data and stream water quality data. Generally, the waters were of good to moderately good quality, in most cases meeting the present standards. It was seen that currently 84 percent of the State's "swimmable, fishable" goal showed the percentages of waters meeting the goal ranged from 90 percent to 79 percent.

Control Program

Various programs of the State cover a wide range of activities in pollution control and management. Construction grant projects for numicipal facilities continue to be actively processed without compromising their quality. Facilities plans (Section 201 of Public Law 92-500) have been approved for 16 areas State construction permit issuance increased this, reflecting the upgrading of treatment plants and the effectiveness of the NPDES permits.

Under Section 401 (Public Law 92-500) a total of 727 State Water Quality Certifications were issued by the Department of Health and Environmental Control(DHEC) during 1975-76 to applicants for Federal permits or licenses.

A brief description of each Section 208 area is included. An analysis of the Fiscal Year 1977 Program Plan for South Carolina showed that many major dischargers are currently meeting 1977 standards.

Special programs such as oil spill prevention and fish kill investigation are all contributing to the control of potential pollution problems.

No new areas were closed to shellfishing in 1976. At present, two million bushels are produced from open areas, and closed areas have the potential for one million bushels.

Costs and Benefits

Costs given are taken from the 1976 "Needs Survey". These costs are broken into five categories and estimates of each was made.

The benefits of water pollution control are discussed very generally. Statewide, many programs are too recent to show definite water quality benefits.

Nonpoint Sources

Because of their very nature, nonpoint sources have not had the recognition, attention, or evaluation that point sources have received. In the Santee-Cooper basin, nonpoint problems were prevalent around urban areas, and to some degree throughout the basin. The Edisto basin also showed problems prevalent near urban areas and some degree basinwide. Nonpoint sources were not widespread in the Savannah basin, being mostly confined to urban areas. In the Pee Dee basin, the more severe and numerous problems occurred around urban areas and less severe problems in rural areas. Within these problem areas in each basin, the DHEC will conduct surveys to locate and identify the type and volume of the nonpoint source effluents.

State of Tennessee

Complete copies of the State of Tennessee 305(b) Report can be obtained from the State agency listed below:

Tennessee Division of Water Quality Control
Department of Public Health
621 Cordell Hull Building
Nashville, TN 37219

Introduction and Summary

Section 305(b) of Public Law 92-500, and the Federal Water Pollution Control Act Amendments of 1972, requires that each State prepare and submit a report relative to the State position regarding water quality with respect to attaining the goals of PL 92-500. Since these requirements were enacted, this is the third such report to be presented to the Administrator of the Environmental Protection Agency (EPA). This report will serve as a principal part of the State's annual program plan for water pollution control and hopefully, will additionally serve as an aid to decision making by the EPA and the U.S. Congress.

Tennessee's Section 305(b) report herein presented, represents an attempt to answer—within the constraints of available information—the following questions.

- What is the quality of Tennessee waters today and what progress has been achieved in water quality improvement in the last five years?
- What uses of the water are possible today, and what water uses will Tennessee waters support when the provisions of the Federal Water Act (PL 92-500) are implemented to the extent technically or economically attainable?
- In what segments of Tennessee waters will these future intended uses differ from the goals of biosupport (protection and propogation of fish and aquatic life) and recreation (recreational activities in and on the water)?
- What will it cost to achieve these future intended uses? (This will be addressed more fully in the Section 208 planning program.)
- What is the nature and extent of nonpoint sources of pollutants? How can they be controlled, and how much would it cost? (Extensive nonpoint evaluation will be done in the 208 planning program.)

Other questions will be answered, but the preceding represent the integral theme of the report.

The organization of the report is based on the 13 hydrologic basins as described in Tennessee's Continuing Planning Process pursuant to Section 303(e) of the Federal Water Act (Table 1).

TABLE 1
SUMMARY—GOALS OF THE ACT

Basin	No. segments meeting standards	1977 goal possible	1983 goal possible	1983 goal cannot be met	Total segments designated
Lower Tennessee	14	14	15	5	48
Holston	24	6	36	6	72
Lower Cumberland	64	1	8	8	81
Clinch	30	1	30	—	61
Upper Tennessee	20	5	13	5	43
Memphis Area	10	2	28	7	47
French Broad	34	5	14	—	53
Duck	20	5	12	—	37
Obion-Forked Deer	10	1	46	—	57
Tennessee River-Western Valley	17	—	17	—	34
Upper Cumberland	33	1	20	7	61
Elk	19	4	7	—	30
Hatchie	5	1	12	—	18

An overview of water pollution problems in Tennessee indicates that, in general, the quality of waters in the State is very good. There are no gross pollution problems encompassing lengthy segments of streams; rather most of the pollution is confined to short segments of streams and is the result of one or two point source discharges. The main areas which suffer pollution from multiple dischargers are the Chattanooga area, the Upper Holston River in the Kingsport area and to some extent, the areas associated with Nashville, Knoxville and Memphis.

Point source pollution in Tennessee results from the discharge of domestic sewage from such sources as municipalities, schools, hospitals and shopping centers and from the discharge of industrial waste from such sources as chemical plants, paper mills and metal plating companies.

A mixture of point source pollution and nonpoint pollution problems often occurs in and around heavily populated areas as a result of spills followed by storm runoff, improperly designed or placed septic tank systems and construction projects.

Pollution resulting from agricultural activities will be extensively evaluated in the Section 208 planning program. It is currently being investigated through basin planning efforts and through special monitoring related to feedlots. Agricultural activities which are known to affect water quality in Tennessee are confined feeding operations, plowing areas subject to erosion, use of chemicals (that is, fertilizers, herbicides and pesticides), some watershed projects and some drainage projects.

There is a considerable amount of surface mining activity in Tennessee, some of which has a very detrimental effect on water quality. Most of these problem areas are located in the Upper Cumberland River Basin and in the Clinch River Basin and are the result of surface mining for coal in mountainous areas. Because of the energy problems which currently exist, there is likely to be an increase in strip mining for coal with an increase in water quality problems and in environmental degradation. Strong laws and an expanded program in this area will be necessary to prevent pollution and maintain water quality. Another energy-related matter that needs careful and increasing attention is that of nuclear power plants. Water quality may be threatened by both thermal discharges and accidental loss of radioactive materials. State regulatory agencies, as yet, have been given little control or credited with having much expertise relative to this rapidly expanding industry.

Eutrophication problems are not extensive, but some problems do exist in reservoirs receiving a heavy load of nutrients, when the reservoir has a long retention time.

Nonpoint sources have been categorized in the Section 208 Plan of Study for purposes of assessing the water quality impacts, determining feasible solutions to NPS control, and formulating an implementation program. Utilizing the expertise of more than thirty State, local, and Federal agencies involved in operating or managing land-disturbing activities, a sound technical approach to nonpoint source management will be determined.

Special emphasis is being directed toward nonpoint source pollution from land uses which are predominant in the State: Agriculture, forestry, etc., (Table 2). A sub-committee of the Statewide Section 208 Technical Advisory Committee has been organized for each of the planning efforts for agriculture, forestry, and mining. These sub-committees are comprised of public agency representatives, citizen groups, and interested individuals who are themselves involved in nonpoint source activities.

TABLE 2
WATER QUALITY SEVERITY CATEGORIES

Basin	Urban runoff	Construction activity	Hydrologic modifications	Land disposal sub-surface categories	Agriculture	Forestry	Mining
Duck	III	IV	III	IV	III	III	III
Elk	IV	IV	III	IV	III	III	IV
Lower Cumberland	I	II	III	II	IV	IV	III
Upper Cumberland	IV	IV	II	IV	IV	III	I
Lower Tennessee	I	III	II	III	III	III	II
Upper Tennessee	III	III	II	III	IV	III	IV
French Broad	II	II	II	III	III	III	IV
Holston	II	III	II	III	III	II	III
Clinch	III	III	II	III	III	II	I
Obion Forked Deer	III	III	III	III	I	II	II
Hatchie	III	III	III	III	II	III	III
Memphis Area	I	II	III	II	III	III	IV
Tennessee Western Valley	IV	IV	II	III	IV	III	II

Degree of water pollution service: I (Severe); II (Moderately severe); III Moderate; IV Slight.

The nonpoint source assessment is using existing water quality data and field surveys to describe the problems and define their extent. Nonpoint source controls will be determined for each category, following an evaluation of current control measures, both structural (silt basins) and non-structural (county ordinances), and of the efficiency of the current measures related to our water quality objectives. The implementation of nonpoint source controls will be promoted through a combined educational-incentive-regulatory evaluation. The conclusions of the implementation program will be based upon an economic, environmental, and social impact analysis. This analysis will be completed with the technical assistance of the committees involved, with input from elected officials, and feedback from the public.

Although the Section 305(b) report is expected to deal mostly with the problems, some positive points should be emphasized. Tennessee is blessed with an abundance of natural resources ranging from its mountains, forests and fast flowing streams in the east to its fertile cropland and low-lying wetlands in the west. Tennesseans have long valued clean water and partly as a result of superior water quality, there has developed a large recreation-based industry in Tennessee. One objective of the recreation industry is to protect and maintain high water quality. The industry has played a very important part in supporting the Division of Water Quality Control during its 30 years of existence and has aided in getting enacted Tennesses's present Water Quality Control Act which was signed into Law in 1971 and is undoubtedly one of the strongest in the United States.

The Tennessee Act, in conjunction with the Federal Water Act, should ensure that water quality will be maintained and improved. Unfortunately, the implementation of the Federal Act has had a negative impact on the State program by increasing paperwork, complicating interagency decision-making and causing needless duplication of effort. Some unnecessary delays have been experienced, especially with regard to the Federally funded municipal construction grant program. It is hoped and expected that this negative impact is temporary and that the State and Federal Acts will soon complement each other.

One obvious problem in preparing the Section 305(b) report is the requirement that it be prepared and submitted on an annual basis. However, updates and revisions to the basin plans are required on two-year intervals. Although basin planning is an on-going process, substantial changes in the status of particular basin plans may not be obvious on an annual basis, and therefore may reflect little change when viewed in this report.

Duplication of effort is another problem with the Section 305(b) Report. Virtually all the information in this report is available in other planning documents, needs surveys, and computerized data retrieval systems. Because of this redundancy, the value of this report is doubtful. In an effort to minimize this problem, numerous figures, maps and appendices previously included in the Section 305(b) Report will be omitted this year.

Status of Municipal Wastewater Treatment

The total number of municipal wastewater facilities in the population served and the treatment criteria being met at present, are presented in the following paragraphs. Data for the previous five years could not be assimilated in a form which could be realistically compared to present data, since this is only the third such submittal under the Section 305(b) requirements. However, subsequent data will be maintained in a comparable form which will indicate the progress of wastewater systems in future Section 305(b) plans.

In 1976, 262 municipal wastewater systems were in operation in Tennessee. These systems served approximately 1,989,500 people or 48 percent of the State population (Table 3).

Wastewater facilities known to be meeting secondary treatment standards were 108 facilities representing 41 percent of the total operating facilities. Presently, these facilities serve 947,200 people or 47.6 percent of the sewered population or 22.6 percent of the State population.

Wastewater facilities known not to be meeting secondary treatment standards are 151 facilities representing 57.6 percent of the total number of facilities. The portion of the population served by these wastewater facilities is 1,041,493, or 52.3 percent of the sewered population and 24.9 percent of the State population.

There were three wastewater facilities of unknown performance status representing 1.1 percent of the total number of facilities. These facilities serve 800 people or 0.04 percent of the sewered population and 0.02 percent of the total State population.

TABLE 3
MUNICIPAL WASTEWATER TREATMENT FACILITIES

Treatment	Number of facilities	% of total systems	Population served	% of sewered population	% of state population*
Facilities known to be meeting secondary treatment standards	108	41.2	947,208	47.6	22.6
Facilities known not meeting secondary treatment standards	151	57.6	1,041,493	42.3	24.9
Facilities of unknown performance status	3	1.1	800	0.04	0.02

*State population=4,187,906

State of Texas

Complete copies of the State of Texas 305(b) Report can be obtained from the State agency listed below:

Texas Department
of Water Resources
P.O. Box 13087, Capitol Station
Austin, TX 78711

Introduction

The State of Texas Water Quality Inventory for 1977 has been prepared pursuant to Section 305(b) of the Federal Water Pollution Control Act to summarize, as concisely as is practicable, existing water quality conditions in the State.

Information was extracted from basin plans, waste load evaluations, intensive monitoring surveys, and water quality segment reports prepared by or for the staff. In addition, data from the U.S. Geological Survey (USGS) and Texas Water Development Board were also utilized.

Segment descriptions which appear in the report represent only the points used to measure stream miles. Stream miles were measured on 7.5' USGS maps when they were available. Otherwise, mileage was measured on 15' maps. Lakes were measured at the channel except where indicated.

The population densities cited in the report use such subjective terms as sparse, moderate, dense, etc. This was necessary due to constantly changing populations and the resulting lack of totally accurate population figures. Those areas which are undergoing an inordinately rapid gain or loss in population are so noted.

Graphs are presented for water quality limited segments showing the historical progression of the parameter for which the segment was in violation of the stream standard.

Due to time constraints, estuaries and coastal segments were not addressed in this report. Future reports will include these segments.

Statewide Summary Sheet

Current Water Quality

1. Total stream miles classified as segments and subject to State of Texas Water Quality Standards (stream standards) = 15,731.7
2. Stream miles currently fishable and swimmable = 11,873.1 = 75.5 percent
3. Stream miles expected to be fishable and swimmable by 1983 = 866.3 = 5.5 percent
4. Stream miles not expected to be fishable and swimmable by 1983 =2,992.3 = 19.0 percent
   a. Stream miles not fishable and swimmable due to natural conditions (includes waterways which are not intended for fishing and swimming purposes but are compliant with Stream Standards) = 956.6 = 6.1 percent
   b. Stream miles projected not to be fishable and swimmable by 1983 due primarily to point source discharges (includes waterways which are not intended for fishing and swimming but are, nevertheless, degraded by point source discharges) = 1,639.2 = 10.4 percent
   c. Stream miles projected not to be fishable and swimmable by 1983 due primarily to nonpoint sources = 396.5 = 2.5 percent
5. Stream miles currently compliant with Stream Standards = 13,061.1 = 83.0 percent
6. Stream miles currently not in compliance with Stream Standards = 2,670.6 = 17.0 percent

Projected Costs to Achieve 1983 Treatment Levels*

1. Municipal costs (less stormwater treatment) = $2,814,460,000**
2. Industrial costs = $3,315,434,000***
3. Total costs = $6,129,894,000
4. Per capita cost to achieve 1983 treatment levels****
   a. Municipal per capita expenditures = $230.00
   b. Industrial per capita expenditures = $271.00
   c. Total per capita expenditures = $501.00

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*Best Practicable Treatment economically achievable for municipal discharges; Best Available Treatment economically achievable for industrial discharges.

**Based on 1976 Needs Survey.

***Based on 1976 State of Texas Water Quality Inventory.

****Based on 1975 population of 12,237,000.

Trust Territory of The Pacific Islands

Complete copies of the Trust Territory of the Pacific Islands 305(b) Report can be obtained from the State agency listed below:

Division of Environmental Health
Department of Health Services
Trust Territory of the Pacific Islands
Saipan, Mariana Islands 96950

Summary

The Trust Territory of the Pacific Islands has a total of 13 identified segments, four of which are fresh surface waters. The quality of waters in these segments have either improved, due to the elimination of a number of point and nonpoint sources, or remain in their previous condition.

Water pollution from municipal sources results in water below the level of existing standards in most of the district centers in the Trust Territory and remain a major public health problem. The Trust Territory of the Pacific Islands recognizes this problem and is proceeding to construct wastewater treatment facilities and collection systems in all the major segments of the territory.

Wastewater treatment plants are nearing completion in the district centers, with three plants now operating in Saipan and Truk. With the operation of these plants and collection systems, a considerable improvement in water quality is expected to occur.

Due to the recent implementation of demonstration Sanitary Core projects, the public response to connecting onto the sewer system has greatly increased. The Farmers Home Administration loan fund is very active in providing financing for constructing sanitary facilities in private houses to replace the present overwater privies and pit latrines. The cost of these facilities for urban areas is approximately $2,500, and for rural areas with septic tanks, $2,000.

Rainfall runoff, poor land management practices, and the prevalence of simple outhouses in urban and rural areas contribute substantially to the largely undefined nonpoint source problem. The implementation and general acceptance of the earthmoving permit regulations has tended to reduce this problem from construction causes. In 1975, 17 permit applications were received, 11 from the private sector. This activity also increases the general revenue, since a $100 application fee is required from non-government applicants.

Oil pollution incidents in the district center ports continue to decline with few significant spills reported. However, offshore oil spills or bilge pumping by vessels of unknown registry continues to occur. The U.S. Coast Guard, which is responsible for responding to these incidents, does not have a sufficient surveillance or full response capability to patrol Trust Territory waters to reduce the frequency of these offshore events. A new contingency plan is now being planned.

The EPA has recently given interim certification for the district laboratories to perform bacterial analyses. This will increase the effectiveness of enforcement based upon the results of these monitoring activities.

A recent study was done on solid waste management. It included recommendations for land fill sites, collection systems and a draft regulation. When this regulation is approved, the problems of indiscriminate dumping and consequent leaching into the adjacent lagoon areas will be controlled.

State of Vermont

Complete copies of the State of Vermont 305(b) Report can be obtained from the State agency listed below:

Department of Water Resources
Agency of Environmental Conservation
State Office Building
Montpelier, VT 05602

Summary

Vermont's water pollution control problems are significantly different from those of the major urban areas of the United States. Low density population centers and the absence of heavy industrialization has kept the concentration of contaminants in Vermont waters low. This leaves Vermont in a position to maintain or achieve very high water quality standards in the majority of its waters.

Historically, the decisions concerning the abatement of water pollution has focused mainly on the construction of wastewater pollution control facilities to abate gross pollution such as untreated or partially treated municipal and industrial discharges. The decisions to be made in the future are not so clear, and future water quality planning and decisions will be concerned with selecting feasible alternative solutions to complicated, and oftentimes subtle, existing and potential problems.

Vermont will continue to adopt high water quality objectives, thus striving to maintain a low concentration of contaminants in its waters. Abatement methodologies will remain consistent with Federal regulations and future planning will be necessary to take advantage of resource opportunities and to set program priorities in the face of limited financial resources and emerging needs.

TABLE 1
STATE OF VERMONT 305(b) WATER QUALITY INVENTORY SUMMARY

Basin	No.	Total miles	Total miles with drainage area of 10 square miles or greater	Total segmented miles*	Total segmented miles *now* meeting Class B (fishable, swimmable)	Total segmented miles expected to meet Class B by 1983	Total segmented miles *now* meeting State WQ stds.	Total segmented miles *now not* meeting state WQ stds.	Total *non*-segmented miles**	Total miles now meeting Class B (fishable, swimmable)	Total miles expected to meet Class B by 1983
Battenkill Walloomsac Hoosic	1	223	90	46	25	43	27	19	177	202	220
Poultney Mettawee	2	176	91	44	36	40	38	6	132	168	172
Otter Creek Little Otter Creek Lewis Creek	3	467	317	83	70	76	77	6	384	454	460
Lake Champlain	4 & 5	116	54	25	19	20	23	2	91	110	111
Missisquoi River	6	245	153	88	61	82	20	67	157	218	239
Lamoille River	7	412	183	90	21	69	14	70	322	343	391
Winooski River	8	599	255	115	72	95	85	30	484	556	579
White River	9	452	147	69	54	59	59	10	383	437	442
Ottauquechee Black	10	244	110	65	19	38	37	28	179	198	217
West, Williams Saxtons	11	341	167	76	71	74	74	2	265	336	339
Deerfield	12	155	65	34	24	34	16	18	121	145	155
Connecticut	13 & 16	679	152	238	153	170	172	66	441	594	611
Stevens, Wells Waits, Ompompanoosuc	14	271	114	16	6	12	6	10	255	261	267
Passumpsic	15	315	142	47	20	28	25	22	268	288	296
L. Memphremagog Black Barton, Clyde	17	241	104	67	35	61	35	32	174	209	235
Total		4,936	2,144	1,103	686	901	708	388	3,833	4,519	4,734
% of total miles		—	43	22	14	18	14	8	78	92	96

*Segmented miles: River miles affected by municipal and industrial discharges.

**Non-segmented miles: River miles without polluting discharges and assumed to be meeting water quality standards.

Virgin Islands

Complete copies of the 305(b) Report for the Virgin Islands can be obtained from the State agency listed below:

Division of Natural Resources Management
Department of Conservation and Cultural Affairs
Charlotte Amalie, St. Thomas, VI 00801

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Summary

This report was prepared by the Division of Natural Resources Management, Virgin Islands Department of Conservation and Cultural Affairs with data and other inputs secured by its monitoring program and those of other agencies of the Virgin Islands Government. It was prepared as required by Section 305(b) of the 1972 Federal Water Pollution Contral Act Amendments (Public Law 92-500) which calls for a report by each State assessing the water quality of all navigable waters and the waters of the contiguous zone.

Estimated cost for control actions to eliminate all pollution of the coastal waters of the Virgin Islands is:

Segment A—St. Thomas—$18,404,436
Segment B—St. John — 1,920,000
Segment C—St. Croix — 36,703,649
$57,028,085

All of the coastal waters of the Virgin Islands now meet Natural Water Quality Standards as well as Virgin Islands' Water Quality Standards.

All waters of the Virgin Islands are classified as effluent limited.

The Virgin Islands are in Storet Basin No. 19. The Basin has been broken down into three segments as follows:

1. Segment A—St. Thomas, 52.8 miles of shoreline.
2. Segment B—St. John, 49.7 miles of shoreline.
3. Segment C—St. Croix, 70.3 miles of shoreline.

All of the waters in Segments A, B, and C are maintained in compliance with the Virgin Islands' Water Quality Standards.

Monitoring information contained in Appendix B show that water quality has improved in both Segments A and C as a result of water pollution control programs over the last five years. The most improvement has occurred in the harbor of Charlotte Amalie in Segment "A". This is a result of the construction of the Charlotte Amalie Sewerage System, which removed two and a half million gallons per day of raw sewage from the waters of the harbor. Three interceptors, two force mains and two pumping stations are utilized to collect and transport sewage, previously discharged to the harbor, to a primary sewage treatment plant. The treated effluent is discharged through an ocean outfall, 2,650 ft. from shore at a depth of seventy feet.

Fecal coliform counts have fallen from a high of 10,000 per 100 ml. to less than 70 per 100 ml. Average Secchi depth readings have increased from less than 3 meters to four meters. Dissolved oxygen levels have increased from an average of 6.0 ppm to an average of 6.6 ppm.

Water quality monitoring for Segment B indicates that water quality which was previously excellent in this segment, has not changed.

In Segment C, the greatest increase in water quality has occurred along the south shore of St. Croix.

Dredging activities for developing and maintaining shipping channels to provide access to facilities owned by Hess Oil Virgin Islands Corporation in 1966-67, and Harvey Alumina Virgin Islands Corporation in 1963-64, distributed fine-grained clay deposits in a manner that caused extreme turbidity and excessive pollution along 13.8 miles, or about 47 percent, of the south coastline of the island. Enumeration of inorganic suspended solids, most assumed to be particles of clay, showed these particles exceeded densities of 150,000,000 per liter. Water clarity was reduced as much as 95 percent in many places in these turbid reaches. Such conditions caused severe pollution that was almost catastrophic in scope; it extended seaward from shore up to a distance estimated to be at least one mile; reefs were not readily visible, thus endangering navagation; recreational values were totally lost; sea food animals once abundant, were decimated to unharvestable levels; and land values were seriously reduced. These turbid waters terminated abruptly at Sandy Point near the southwest cape of St. Croix, where there was a dramatic change in water clarity.

Water quality adjacent to the industrial complex on the south shore of St. Croix is presently good. Average values for all water quality parameters in this area are approximately equal to average values observed in clean water elsewhere. Levels of most parameters also fall within the ranges observed elsewhere.

Those waters outside areas of municipal and industrial development are generally clean. Quality of these waters is essentially identical around all three islands. Temperature averages 28.2 degrees Centigrade (82.8 degrees Fahrenheit).

Dissolved oxygen varies from 4.4 to 8.9 mg/l. The mean dissolved oxygen level of 6.8 mg/l is well within the 5.5 mg/l required by the approved Federal-State Water Quality Standards. In Trunk Bay, St. John—where the standards require that natural conditions be maintained—the dissolved oxygen level is 6.5 mg/l. The prevailing total and fecal coliform levels are below 0.5 organisms per 100 ml. Nitrate and total nitrogen levels average 0.07 mg/l and total organic carbon averages 9.7 mg/l. Dissolved copper, cadmium, chromium and lead levels are less than 100 mg/l. Zinc and aluminum levels are approximately 300 mg/l. Mercury averages only 0.23 mg/l. Average levels of copper, cadmium, zinc, chromium, lead and mercury in bottom sediments are 13.5, 13.1, 20.0, 7.6, 38.4, and 0.022 mg/kg, respectively (based on dry weight).

In addition benthic communities have recovered substantially from past damages.

All of the reefs between Hess and Sandy Point were adversely affected by the high turbidity and suspended and settling sediment caused by the dredging. All of the reefs, however, have begun to recover although recovery is being inhibited by the continued presence of high concentrations of sediment in the nearshore waters.

The following sources of pollution of Southshore waters were also eliminated or modified.

1. Waters from the V.I. Rum Distillery, Ltd. which were previously discharged at the shoreline were piped 3,000 feet from shore. Here, the prevailing

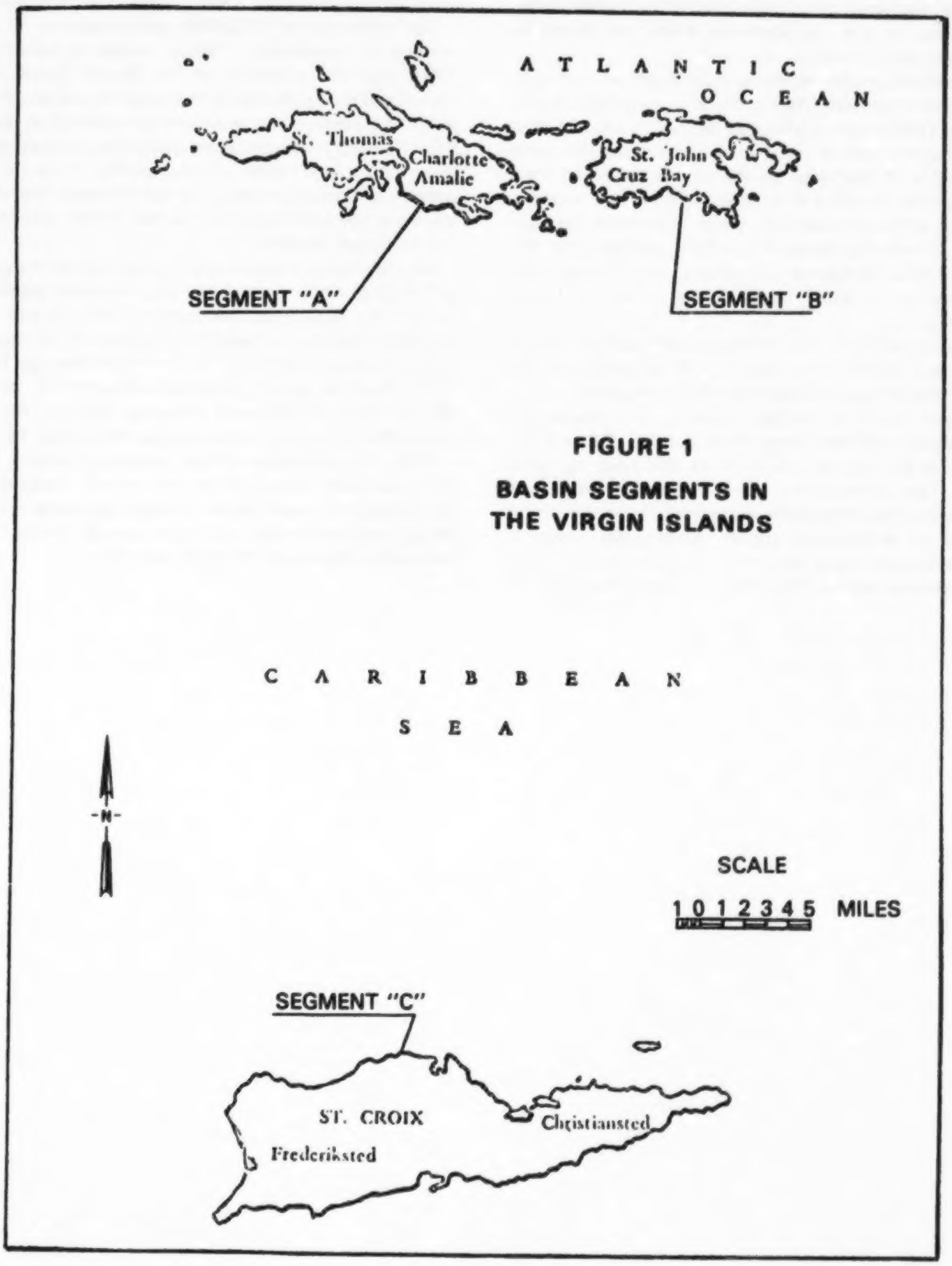
ATLANTIC
OCEAN
St. Thomas
Charlotte
Amalie
St. John
Cruz Bay
SEGMENT "A"
SEGMENT "B"
CARIBBEAN
SEA
N
SCALE
1 0 1 2 3 4 5 MILES
SEGMENT "C"
ST. CROIX
Frederiksted
Christiansted

FIGURE 1

BASIN SEGMENTS IN THE VIRGIN ISLANDS

currents now carry the brown-colored "lees" parallel to shore until they are dissipated.

2. The open burning dump and marine landfill was converted into a sanitary landfill. This eliminated the discharge of tin cans, bottles, and other floatables, as well as leachings from the dump as sources of pollution.
3. Martin-Marietta Alumina discharges of hot saltwater from both their process cooling and desalting plants were eliminated by the installation of a nineteen acre cooling pond. Changing the main points of discharge to the deeper water of their channel from the shallow shoreline on the western end of their property has also eliminated the constant reintrainment of clay fines deposited by the previous dredging operations, and those discharged to shore water by runoff during heavy rains.
4. Construction of a primary sewage treatment plant and a 9,000-foot ocean outfall removed the discharge of raw sewage from inshore waters.

Present cause of the high turbidity and suspended and settling sediment near shore (TerEco Corporation 1973), is still the reintrainment of clay fines by wave action. These clay particles are the result of erosion of clay soils in the immediate shore areas by wave action as well as stormwater runoff. Additionally, there is still leaching by wave action of the lower seaward side of the dredge-spoil settling basin on the western end of Cane Garden Bay constructed by Hess during its last dredging operations. The walls of the basin and jetty are protected by large boulders, but these do not prevent leaching of the fine material by wave action. It is expected that leaching of the fines will gradually cease.

The discharge of 300,000 gallons-per-day of raw sewage to Frederiksted Harbor ceased in November, 1974, with the activation of the Strand Street Interceptor and the Frederiksted Pumping Station and Force Main. The Sewage is now receiving treatment at the St. Croix Sewage Treatment Plant located at Krause Lagoon (Figure 12 of the report). Water quality in the harbor, which was previously good has not changed. However, the slight sewage slick from the two former discharges can no longer be seen.

No progress has been made in reducing the moderate pollution of Christiansted Harbor. However construction of the system of interceptors, force mains, and pumping stations to collect and transport all sewage generated by the town to the St. Croix Sewage Treatment Plant is almost complete (Figure 12 of the report). The Christiansted Pumping Station, the last element of the system will be completed in July, 1977.

With the completion of the sewerage system, sediment pollution from stormwater runoff remains the Virgin Islands' major water pollution problem. This is being addressed under the Virgin Islands' Section 208 Areawide Wastewater Management Plan.

State of West Virginia

Complete copies of the State of West Virginia 305(b) Report can be obtained from the State agency listed below:

Division of Water Resources
Department of Natural Resources
1201 Greenbrier Street
Charleston, WV 25311

Introduction

This report was prepared by the West Virginia Department of Natural Resources, Division of Water Resources, pursuant to Section 305(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). The report is an inventory of water quality in the State and is submitted through the Environmental Protection Agency Administrator for the Congress. The chapter on the Ohio River was prepared by the Ohio River Sanitation Commission (ORSANCO) at the request of the State of West Virginia.

Summary

Total and fecal coliform are in violation of State standards in most segments of the State's waters. These waters are generally designated for water recreation, water supply and the propagation of aquatic life. Required improvements in municipal and some industrial discharges will minimize the fecal coliform levels in the river basins. Nonpoint sources of total and fecal coliform bacteria will be the primary problem in determining future compliance with State standards.

The dissolved oxygen levels are of a good quality in all river basins of the State. Mathematical calculations of stream loadings indicate that the oxygen level of the segment of the Kanawha River below Charleston may not meet State standards during low flow conditions. However, the oxygen-consuming compounds have been markedly reduced by improvements in secondary treatment of industrial waste sources and secondary municipal waste treatment.

Common indicators of water quality such as temperature, dissolved solids, pH, acidity, alkalinity, chlorides, sulfates, nitrates, and phosphorus are of good quality throughout the year in most of the State's rivers. One exception is drainage from the mining industry on the three major tributaries of the Mononghahela River. These are the Cheat River, the West Fork River and the Tygart Valley River.

Acid mine drainage problems in the State have improved generally from 1971 to 1976. This is as expected and will probably continue in the next few years. However, conditions will begin to deteriorate in the near future as more mines are abandoned and treatment of their discharges is discontinued. Strong State requirements governing acid mine drainage from abandoned facilities would alleviate this situation. If these requirements are not forthcoming soon, the problem will reach a point of no return, beyond which it will be out of control without major technological and capital investments.

Heavy metals and toxic substances are normally below State standards. On occasion, cadmium, arsenic, and lead exceed State standards in several areas. Total iron and manganese exceed reference levels set for water supplies in almost all major rivers of the State. The metals in the water do not appear to be related to point sources, but more to urban and rural runoff.

Suspended solids in the Big Sandy-Tug Fork, Guyandotte, Kanawha, and Monongahela Basins appear to be associated with mining industry, road construction, silviculture and urban runoff. Concentrations are generally seanonal with high solids associated with high winter flows.

In the Potomac Basin, the suspended solids are generally in an acceptably good quality range.

State of Wisconsin

Complete copies of the State of Wisconsin 305(b) Report can be obtained from the State agency listed below:

Department of Natural Resources
P.O. Box 7921
Madison, WI 53707

Summary

What is happening to Wisconsin's lakes and streams? How polluted are they? Are they getting better or worse? The State of Wisconsin report attempts to answer these questions by reducing the tremendous store of water quality information available and presenting an interpretation in language easily understood by the interested and reasonably well informed reader.

Typically, an analysis like this raises as many questions as it answers. How clean does our water need to be? National water quality goals and State standards are outlined. What will it take to meet water quality goals? Treatment systems being installed by major dischargers are described. The prognosis for getting systems into operation within the required time frame is outlined, and available information on the costs of all this activity is summarized.

What can we expect to get from our pollution control efforts? New wastewater treatment systems are being brought on line as legal deadlines approach, and results are beginning to show. This report documents significant improvements and cites examples showing what can be expected when pollution control facilities are installed and properly operated.

Finally, what is the extent of water pollution from nonpoint sources? The final chapter of the report is a description of nonpoint problems in Wisconsin and an outline of programs proposed to alleviate them.

Since the ultimate success or failure of environmental programs is decided at the grass roots level by people who demand legislation, keep an eye on implementing agencies, apply pressure to polluters and invariably pay the bills for the entire process, it is to these people that this report is dedicated. Our goal is to provide an understandable interpretation of water quality management information in order to stimulate and to get more people involved in the management process.

State of Wyoming

Complete copies of the State of Wyoming 305(b) Report can be obtained from the State agency listed below:

Water Quality Division
Department of Environmental Quality
State Office Building West
Cheyenne, WY 82002

Summary

Water quality inventories and profiles for FY 1976 show a generally high quality of water in most stream segments in Wyoming, with no significant degradation since FY 1975. Twenty segments were documented as having water quality problems during 1976.

Municipal sewage discharges, in addition to irrigation diversions and nonpoint sources due to agricultural activities, constituted the major sources of water quality degradation. It is anticipated that at least twelve of these segments will meet the 1983 goals of swimmable, fishable waters.

Currently, 13 segments are not meeting Wyoming's Water Quality Standards, mainly due to fecal coliform violations. Municipal sewage effluent discharges are the major point source pollution problem in Wyoming. Most municipal discharges surveyed were not meeting secondary treatment standards for fecal coliforms and biological oxygen demand. Upgrading of many of these facilities will be contingent upon the availability of additional Section 201 Construction Grants. In many areas of the State, rapid population growth associated with the development of energy resources has surpassed the treatment capacity of existing waste water facilities. Municipal treatment problems are expected to continue as resource development increases; the current lack of Section 201 construction grant funding may be a constraint in alleviating these problems.

Except for produced water from oil field operations, point source pollution by industrial discharges is not considered to be a major problem. Twenty-six percent of the industrial facilities (excluding oil well treaters) were in non-compliance with Best Practical Treatment (BPT) Standards. Most of these facilities will meet BPT requirements in 1977, after facility modifications are completed.

Forty-two percent of the oil treater facilities monitored were in violation of Wyoming's oil and grease limitation; approximately ninety-five percent of the violations were due to improper operation and maintenance of the facilities. However, most violations were marginal and short-term, and did not occur repeatedly in the same facilities. Consequently, only one enforcement action by the State of Wyoming Department of Environmental Quality was necessary during FY 1976.

Major nonpoint source pollution problems in Wyoming are sediments, turbidity and salinity contributed by irrigation return flows, natural erosion and man induced erosion. Eleven of the twenty problem segments were significantly impacted by irrigation diversions and return flows. Sewage seepage from individual septic tanks, package plants and undetected "straight shots" into streams also degraded water quality in some segments. Isolated temperature violations were detected in four segments; in all cases, these occurred in summer months under natural low flow conditions and were marginal violations ranging from 0.5 to 1.5 degrees Centigrade above the limit. Low flow conditions also resulted in occasional violations of the dissolved oxygen standard in seven Class I segments; these, too, were marginal violations.

Ninety-five violations of the existing Wyoming Water Quality Standard for pH were documented. Most of these violations were marginal and resulted from natural diurnal variations in pH caused by normal plant metabolism. Under EPA criteria for aquatic life (6.5 to 9.0) only seven excesses were observed, due mainly to natural conditions.

Trace metal excesses are common in streams throughout the State, due to the high metal content of the soils in many areas. This is particularly true in the Northeast, Green, and Powder River Basins where large coal, uranium and mineral deposits exist. In most segments, the excesses are due to natural runoff. One exception is Haggerty Creek which receives groundwater discharges from an underground copper mine. Although the original mine was abandoned in 1903, copper effluents from one of the abandoned mine shafts have essentially sterilized Haggerty Creek below the point of discharge. The mine is now being reworked and the mining company is installing a treatment system to meet NPDES copper limit of 0.5 mg/l. However, the inaccessibility of the mine location during eight months of the year will prevent maintaining and operating the system during this period. Hydrogeologic studies are needed to determine if other methods of mine drainage control are feasible. Haggerty Creek is considered to be one of the most serious water quality problems in Wyoming.

Excesses of gross alpha radioactivity occurred in segments that drain uranium mining regions where the soil contains naturally high levels of radioactivity. These excesses occurred predominantly during runoff periods. Excessive radioactivity is particularly apparent in the Medicine Bow and Little Medicine Bow Rivers, which are considered to be major water quality problems. It is not known how much of the radioactivity is contributed by mining activities and what portion is due to natural loading. During FY 1977, a special study will be initiated in the Medicine Bow and Little Medicine Bow Rivers to delineate sources of radioactivity in these segments.

Only three pollution-caused fish kills were documented in FY in 1976. All of the kills involved non-game species and were attributed to agricultural activities including over-fertilization of adjacent lands, water diversion, and pesticide use. An overall assessment of water quality in Wyoming indicates that there are few pollution sources interfering with the production and maintenance of fish populations, and that Wyoming's waters are sustaining fish and wildlife suitable for recreation.

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